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THE USE OF SAFETY BEHAVIOURS DURING IN VIVO EXPOSURE FOR ANXIETY

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Summary

Given the debilitating effects of those experiencing high anxiety, it is important to have effective, evidence-based treatments (National Institute of Clinical and Health Excellence, 2014). However, there is a debate in the literature about whether interventions for anxiety should involve exposure with the use of safety behaviours, or, exposure without the use of safety behaviours.

Section A presents a systematic literature review of the empirical evidence regarding the role that safety behaviours play during in vivo exposure for anxiety for adults. 21 studies were reviewed and discussed in terms of their methodological limitations and theoretical underpinnings. The recommendations from this review were carried forward into Section B, an empirical investigation into the longer-term impact of safety behaviours.

Section B randomised spider-fearful participants into three groups: exposure (1) with or (2) without the use of safety behaviours, or (3) a non-exposure control. It was suggested that cognitive theory and the inhibitory learning model are better able to account for the impact of using safety behaviours than emotional processing theory. It is subsequently suggested that the emerging evidence that safety behaviours can facilitate recovery is flawed theoretically and empirically.

Section A: Systematic Literature Review

Abstract 2

1. Introduction 3

1.1 Anxiety 3

1.2 Safety Behaviours 4

1.3 Rationale 4

1.4 Aim 5

2. Theoretical Explanations 6

2.1 Two-Stage Theory and Systematic Desensitisation 6

2.2 Emotional Processing Theory (EPT) 6

2.3 Safety-Signal Theory 7

2.4 Inhibitory Learning Model 8

2.5 Cognitive Theory 9

2.6 Theoretical Summary 10

3. Method 10

4. Results 14

4.1 Single Case and Repeated Measures Studies (n = 5) 22

4.2 Between-Group Studies: without Control and Follow-Up (n = 6) 24

4.3 Between-Group Studies: with Control (n = 5) 28

4.4 Between-Group Studies: with Follow-Up (n = 3) 29

4.5 Methodologically Strongest Studies (n = 2) 30

5. Discussion 32

5.1 Future Research 35

5.2 Limitations 36

6. Conclusion 36

References 38

Section B: Empirical Study 46

Abstract 47

1. Introduction 48

1.1 Theoretical Underpinnings 49

1.2 Current Study 51
1.3 Aim 53
1.4 Hypotheses 54
2. Method 55
2.1 Design 55
2.2 Participants 56
2.3 Recruitment 56
2.4 Screening 56
2.5 Sample 56
2.6 Materials 58
2.6.1 Spiders 58
2.6.2 Equipment for behavioural approach tests 58
2.6.3 Equipment for safety behaviours 59
2.6.4 Software 59
2.7 Measures 59
2.7.1 Structured clinical interview for axis 1 disorders 59
2.7.2 Behavioural approach tests 59
2.7.2.1 Behavioural approach test 1 60
2.7.2.2 Behavioural approach test 2 60
2.7.3 Questionnaire data 60
2.7.3.1 Spider phobia questionnaire 60
2.7.3.2 Fear of spider's questionnaire 61
2.8 Procedure 61
2.8.1 Appointment two 61
2.8.2 Appointment three 65
2.9 Ethical Considerations` 65
2.10 Data Analysis 65
3. Results 66
3.1 Manipulation Checks 66
3.1.1 Clinical presentation 66

3.1.2 Appointment gaps 66
3.1.3 Safety behavioural adherence 66
3.1.4 BAT2 67
3.2 Baseline Checks 67
3.3 Preliminary Results 67
3.3.1 BAT data. Main effects 68
3.3.1.2 Within-groups: BAT1 68
3.3.2 Questionnaire data. Main effects 69
3.3.2.2 Within-group effects: FSQ 69
3.3.2.3 Within-group effects: SPQ 69
3.3.2.4 Between-group effects: Follow-up 70
3.4 Hypotheses-Based Results 70
4. Discussion 73
4.1 Short-Term Gains 73
4.2 Retaining and Generalising Gains 74
4.3 Practice Implications 75
4.4 Limitations 76
4.5 Future Research 77
5. Conclusion 77
References 79
Section C
Appendix A Data Extraction Form 87
Appendix B A Priori Power Calculations 88
Appendix C Ethical Considerations 89
Appendix D Participant Instructions for BAT1 and BAT2 91
Appendix E Exposure Session: Rationale for Participants 93
Appendix F Participant Consent Form 97
Appendix G Participant Information Sheet 98
Appendix H Ethical Approval 102

Appendix I Correlational Analyses 104

Appendix J Study Feedback 105

Lists of content

List of tables and figures

Figure 1. PRISMA flow diagram 12

Figure 2. PRISMA flow diagram 13

Figure 3. Participant flowchart 57

Figure 4. Study schematic 64

Table 1. Overview of the 21 reviewed papers 15

Table 2. Demographic information 58

Table 3. Safety behaviours used by participants 63

Table 4. Means and standard deviations for dependent variables by group 68

Figure A1. G*Power Screenshot 88

Figure A2: CBT maintenance cycle 95

Figure A3. Participant Maintenance Cycle 96

A systematic review of the evidence of the role of safety behaviours within cognitive and behavioural interventions for anxiety problems.

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Abstract

There has been increasing debate in the literature about whether the use of safety behaviours during in vivo exposure for anxiety helps or hinders recovery (Helbig-Lang & Petermann, 2010; Rachman, Radomsky & Shafran, 2008). The author aimed to contribute to this debate by systematically reviewing the empirical evidence for the role that safety behaviours play with greater consideration to the underlying theories.

A systematic literature search for empirical investigations into the use of safety behaviours during in vivo exposure was undertaken. Studies had to be peer-reviewed, in the English language, participants aged 18+ years, and anxiety as the primary difficulty; 21 studies were identified.

Identifying the role that safety behaviours play during in vivo exposure was complicated by methodological limitations, which partly accounted for the conflicting results. However, the general tendency was that safety behaviours were able to provide short-term gains (such as approaching a feared stimulus more quickly/closely) but these were not sustainable. Thus there was little support for the theoretical justification for judiciously using safety behaviours. The role of safety behaviours as proposed by cognitive theory (Salkovskis, 1991) and the inhibitory learning model (Craske et al., 2008) received more support. However, it was identified that future research would likely benefit from a change in the way that the role of safety behaviours is investigated, particularly in terms of choice of outcome measures and a more idiosyncratic approach to safety behaviour manipulation.

Keywords: Safety behaviours, anxiety, exposure, cognitive-behavioural.

1. Introduction

This systematic review examines the empirical evidence regarding the use of safety behaviours during exposure therapy for anxiety, particularly within the context of theory. There is a specific focus on adults, the use of in vivo exposure, and how exposure is conducted within cognitive-behavioural frameworks. A brief background of anxiety and safety behaviours is given, followed by a summary of the different theoretical underpinnings of exposure therapy. The systematic literature search is described in section three and the results are explained in section four. Section five discusses the results and the identified roles of safety behaviours from differing theoretical perspectives, leading to recommendations for future research. The limitations of this review are also considered. Section six concludes this review. Systematic review guidelines (Aveyard, 2010) were followed.

1.1 Anxiety

Anxiety is well-established as an adaptive response designed to help plan and prepare for future events while fear is an adaptive response designed to keep us safe from imminent danger (Kring, Davison, Neale & Johnson, 2007). However, anxiety and fear can also be experienced as excessive and unhelpful and it is this end of the spectrum that this review focusses on. While fear and anxiety differ in their temporal nature (imminent versus future), they are used synonymously here as anxiety disorders tend not to distinguish between the two (Abramowitz, 2013).

In 2013, the global prevalence of anxiety disorders was estimated at 7.3%, and up to 10.4% in Euro/Anglo cultures (Baxter, Scott, Vos &Whiteford, 2013). Due to differing methodologies, it is difficult to estimate the current prevalence in the UK (Mental Health Foundation [MHF], 2014) but anxiety appears to be one of the most common health conditions in Britain (MHF, 2007; Office for National Statistics [ONS], 1995). This suggests a need for effective, evidence-based treatment options.

In vivo exposure within a cognitive-behavioural framework is the usual intervention facilitating the recovery from clinical anxiety because it has a strong evidence base (National Institute of Health and Clinical Excellence [NICE], 2014). The aim of therapy is for the client to be able to be in the presence of the feared stimuli but not experience the distress that they used to.

1.2 Safety Behaviours

The concept of safety behaviours (SBs) came from cognitive theory (Salkovskis, 1991). It is a term used to describe the active and passive avoidance strategies that people use to reduce their fears and develop security (ibid.). However, their use is thought to maintain pathological anxiety in the long term with some studies suggesting that they can also exacerbate the problem (Beck, 2011). As such, official clinical guidance in the UK recommends that clients with anxiety disorders confront their feared stimulus without the use of SBs in order to fully benefit from exposure (NICE, 2005; 2011; 2013).

However, there has also been concurrent evidence that SBs are not necessarily harming to the recovery (extinction) process (Bandura, Jeffrey & Wright, 1974; Rachman, Radomsky & Shafran, 2008). More recently, some studies have compared exposure with and without the use of SBs, and have shown comparable between-group results (e.g. Milosevic &Radomsky, 2008; Rachman, Shafran, Radomsky & Zysk, 2011). This is important because refusal and drop-out rates within cognitive-behavioural anxiety intervention can be high (Arch & Craske, 2009; Bados, Balaguer & Saldana, 2007). Engaging in exposure with the use of SBs is arguably more amenable to clients and would therefore address high refusal and dropout rates that can be attributed to the demands of exposure without the use of SBs.

1.3 Rationale

Given that the importance of anxiety disorder treatment has been established, it is crucial to have a clearer understanding as to why some clinicians would argue that the

judicious use of SBs facilitates effective interventions, whereas others would argue that it undermines effective interventions. In order to make sense of the discrepancy, the theoretical literature was summarised (Section 2) and then compared to empirical studies investigating this issue (Section 3).

The theoretical perspective complements a relatively recent review of the effects of safety behaviours (Helbig-Lang & Petermann, 2010) which focussed on defining, categorising and conceptualising safety behaviours and how this linked to empirical evidence.

The theoretical perspective is also important because it has been given less attention. Reese, Rosenfield and Wilhelm (2013) argued that less consideration has been given to the link between theory and research, and theory and intervention. A recent special edition of Behavior Therapy postulated several reasons for this: the current drive to simplify treatment, the pressures on psychologists/therapists to implement treatment quickly and widely, the current emphasis on outcome precluding thorough testing of underlying theory, the occasional lack of consensus between theories, and that theory can be difficult and time-consuming to understand (Abramowtiz, 2013; Herbert, Gaudiano & Forman, 2013; Reese et al., 2013).

1.4 Aim

This systematic review aims to review the evidence of the role of SBs in order to provide direction for future research. This includes methodological improvements and recommendations based on the results. The review also aims to give a greater consideration to the theoretical underpinnings of anxiety intervention as this has received less attention in the literature. To fulfil these aims, several research questions were identified:

- Under which conditions are SBs regarded as helpful or unhelpful during in vivo exposure?

- What impact does using SBs during in vivo exposure have on anxiety levels and participant ability to be in the presence of their feared stimuli/situation?
- Which theories underpinning effective anxiety treatment receive support from the empirical literature?

2. Theoretical Explanations

2.1 Two-Stage Theory and Systematic Desensitisation

Early behavioural models recommended that exposure targets fear (developed via classical and/or operant conditioning) by reducing the conditioned response to the feared stimuli, a process known as extinction (Abramowitz, 2013).Two-Stage Theory (Mowrer, 1939; 1960) proposed that avoiding a feared situation is reinforced when avoidance is associated with lowered anxiety. Systematic desensitisation (Salter, 1949; Wolpe, 1958) requires pairing the feared stimulus with an experience that is incompatible with anxiety so that the association between the feared stimulus and anxiety is weakened. This is done in a gradual (systematic) way so that the person gradually becomes used to being in the presence of the feared stimuli without feeling anxious (i.e. desensitised to the feared stimulus). Therefore, the therapist's aim is to facilitate reduced anxiety – also known as habituation. As a result, the earliest forms of exposure therapy proposed that targeting lowered anxiety levels were the key to progress.

Given that these theories pre-date the concept of SBs, there were no predictions about whether SBs would play a helpful or unhelpful role. However, given that SBs temporarily reduce anxiety, it may be suggested that SBs might be helpful in initiating the habituation process.

2.2 Emotional Processing Theory (EPT)

EPT (Foa & Kozak, 1986; Foa & McNally, 1996; Rachman 1980) is predicated on exposure therapy facilitating (1) initial activation of the fear structure (i.e. the client has to

feel sufficiently anxious), (2) within-session habituation and (3) between-session habituation. The concept of a fear structure was introduced by Lang (1971); it is a mental representation of the fear/anxiety. Proponents argue that reduced anxiety is an experience that is incompatible with the fear structure, thereby producing a new fear structure – ideas, responses and meanings – to represent this change. Although EPT is slightly more specific than systematic desensitisation, they both argue that reduced anxiety is essential for successful exposure therapy. One of the main criticisms however is the low retention rate i.e. that the anxiety tends to resurface (see Sections 2.3 and 2.4).

As in Section 2.1, the judicious use of SBs could be hypothesised as helpful because the relief and lowered anxiety would be incompatible with the fear structure and could (theoretically) help to facilitate within-session habituation.

2.3 Safety-Signal Theory

The safety-signal hypothesis was introduced by some of the earliest pioneers of exposure therapy (Mowrer, 1960; Gray 1971) and extended by Rachman (1983; 1984). It was developed in recognition that lowered anxiety alone seems to produce moderate recovery rates. It proposed that the feared stimulus/situation is followed by a safety signal (such approaching a trusted person) so that the feared stimulus/situation is associated with relief. For example, asking an agoraphobia patient to travel by bus (feared situation) towards their spouse (safety signal) will result in the bus journey being associated as the safety experience rather than the dreaded experience. Self-efficacy is suggested as a mediator based on the hypothesis that levels of self-efficacy positively correlate with the use of coping behaviours (Rachman, 1983). However, Rachman (1984) acknowledged that this theory does not necessarily account for all formulations of avoidance behaviour.

There appears to be conceptual overlap between this theory and how SBs were defined (Section 1.2). The difference is that the safety-signal theory predicts how SBs can be helpful

during exposure therapy (by weakening the conditioned response) whereas cognitive theory would predict that SBs can be unhelpful during exposure therapy (by preventing a decline in strength of negative automatic thoughts – Section 2.5).

2.4 Inhibitory Learning Model

The inhibitory learning model (ILM; Craske et al., 2008) proposes that one fear structure is not replaced by another, but that a new fear structure sits alongside the old one. This is said to explain why clinical or subclinical levels of anxiety can return, particularly after significant time has passed, or when the client is in a different context.

Building on this, the ILM also warns against an over-emphasis on within- and between-session habituation because of the link with poor emotion regulation (i.e. habituation persistently facilitates an artificial, and thus unsustainable, down-regulation of anxiety). In this sense, the ILM argues for anxiety tolerance, rather than anxiety reduction. This tolerance leads to a natural habituation, rather than a 'coerced' habituation. Therefore instead of lowered anxiety being the main process during exposure therapy, it is the main outcome i.e. instead of focussing on lowering anxiety levels during exposure, they propose that the process should be focussed on strengthening the new alternative fear structure using repeated experiences of exposure to the feared stimulus in a variety of contexts. The anxiety levels will then reduce without needing direct intervention on them.

The ILM does not explicitly align itself with behavioural or cognitive theory, nor does it include SBs as part of the model. However, it could be argued from an ILM perspective that SBs artificially reduce anxiety which would be incongruent with developing fear tolerance. The empirical literature might be able to provide evidence for how the use of SBs impacts upon the process of strengthening the new alternative fear structure.

2.5 Cognitive Theory

The cognitive model proposes that cognitions are collections of mental processes that produce thoughts, beliefs, ideas, mental images and decisions in everyday life. Experiences of clinical anxiety are understood as inextricably mediated by these cognitive processes (Clark, 1999). Thus, while behavioural models tend to link anxiety levels with the maintenance of anxiety disorders, and target new 'anxiety learning', cognitive models tend to link the maintenance of anxiety disorders with thoughts, beliefs, ideas, mental images and decisions (hereafter referred to as 'interpretations' or 'beliefs' for ease of reference). By this account, anxiety levels are determined by the interpretations that people have about the feared stimulus; so while it is important not to ignore anxiety levels, from a cognitive point of view, they are an outcome rather than a focus for new learning (and hence not necessarily part of the active exposure ingredients). Instead, cognitive therapists use cognitive techniques (such as behavioural experiments) to test the interpretations that clients have about the feared stimulus, rather than facilitate habituation (Seligman & Johnston, 1973). The outcome is to reduce the strength of the beliefs (lowered strength in beliefs lowers the resultant anxiety experienced in the presence of the feared stimuli). In this sense, there is alliance with the ILM because of agreed facilitation of anxiety tolerance, rather than anxiety reduction as a vehicle for achieving new meaning about a feared stimulus (Abramowitz, 2013).

As per Section 1.2, SBs originated from cognitive theory and have been a core feature of modern cognitive-behavioural anxiety treatment models (Clark, 1999). While SBs are usually defined as behaviours that prevent disconfirmation of the over-estimation of threat, several concurrent mechanisms have also been proposed: they allow misattribution of the non-occurrence of the threat to the SB (rather than the over-estimation), they can increase the likelihood of the feared outcome, increase symptomatology, redirect attentional resources

away from evidence of the overestimation of threat, and, they act as a danger alert in the feared situation (Abramowitz, Deacon & Whiteside, 2011; Beck, 2011).

2.6 Theoretical Summary

The main area of contention appears to be whether lowered anxiety should be a process and/or outcome of therapy. EPT suggests that lowered anxiety is a key feature of exposure therapy because this is incongruent with the client's fear structure; the incompatibility thus weakens the association of anxiety with the feared stimulus and achieves extinction. Safety signal theory would argue that this is achieved by altering the feared stimulus/situation into a safety stimulus/situation by facilitating the client to approach safety cues during exposure trials. Given that (i) SBs lower anxiety and (ii) the function of safety cues have potential to be aligned with the function of SBs, there is a strong justification for needing to understand that role played by SBs within these theories.

Conversely, the ILM argues that lowered anxiety is subsequent to anxiety tolerance and repeated experiences of exposure within different contexts (to strengthen the new alternative fear structure); SBs would likely be incompatible with anxiety tolerance. Cognitive theory argues that problematic anxiety is best addressed by altering the beliefs and interpretations that are held about the feared stimulus. Given that SBs can interfere with a person's ability to achieve altered beliefs and interpretations, they are argued as being unhelpful to progress. It could also be suggested that the ILM might also view SBs as unhelpful to progress; if SBs interfere with beliefs and interpretations, this might weaken the new alternative fear structure. These differing theoretical positions were considered alongside the empirical evidence generated by a systematic literature search.

3. Method

Suitable databases were chosen by searching under the "Social and Applied Sciences" category, and the "Applied Psychology" subcategory. Of the 36 results, three electronic

databases were selected based on their identification with biopsychosocial approaches to mental health intervention (PsycINFO, the Cochrane Library, and, Web of Science). Suitable search terms were challenging because of the broad range of keywords used in previous research (the author was aware of at least 31 different key words used in just 11 previous studies). Some key words were too narrow, while others were too broad (e.g. "safety behavio*" returned 862 papers on just one database). Consultation with an expert was sought and search terms that could be 'exploded' to specify the level of detail needed were identified. The search terms "cognitive behav* therapy" (which included separate searches for "cognitive", "behavio*" and "cognitive-behavio*") AND "anxiety disorder*" AND "exposure therapy" returned 321 results (see Figure 1). The date range included articles up to and including 31 August 2014.

The references and citations of two key papers were also searched: Rachman et al. (2008, n = 124), and Helbig-Lang and Petermann (2010, n = 104), see Figure 2. The former re-initiated a focus on the use of safety behaviours in light of the recent CBT evidence base (Telch & Lancaster, 2012), while the latter's subject matter (review on safety behaviours) was likely to refer to, and be cited by, relevant studies.

The following inclusion criteria were applied to the total number of results (n = 549): empirical study about the role of safety behaviours, peer-reviewed article, English language, in-vivo exposure, participants aged 18+ years, and, anxiety as the primary difficulty. This excluded: review/conference papers, dissertations, book chapters/reviews, and studies with mixed diagnostic samples where anxiety was not the primary difficulty.

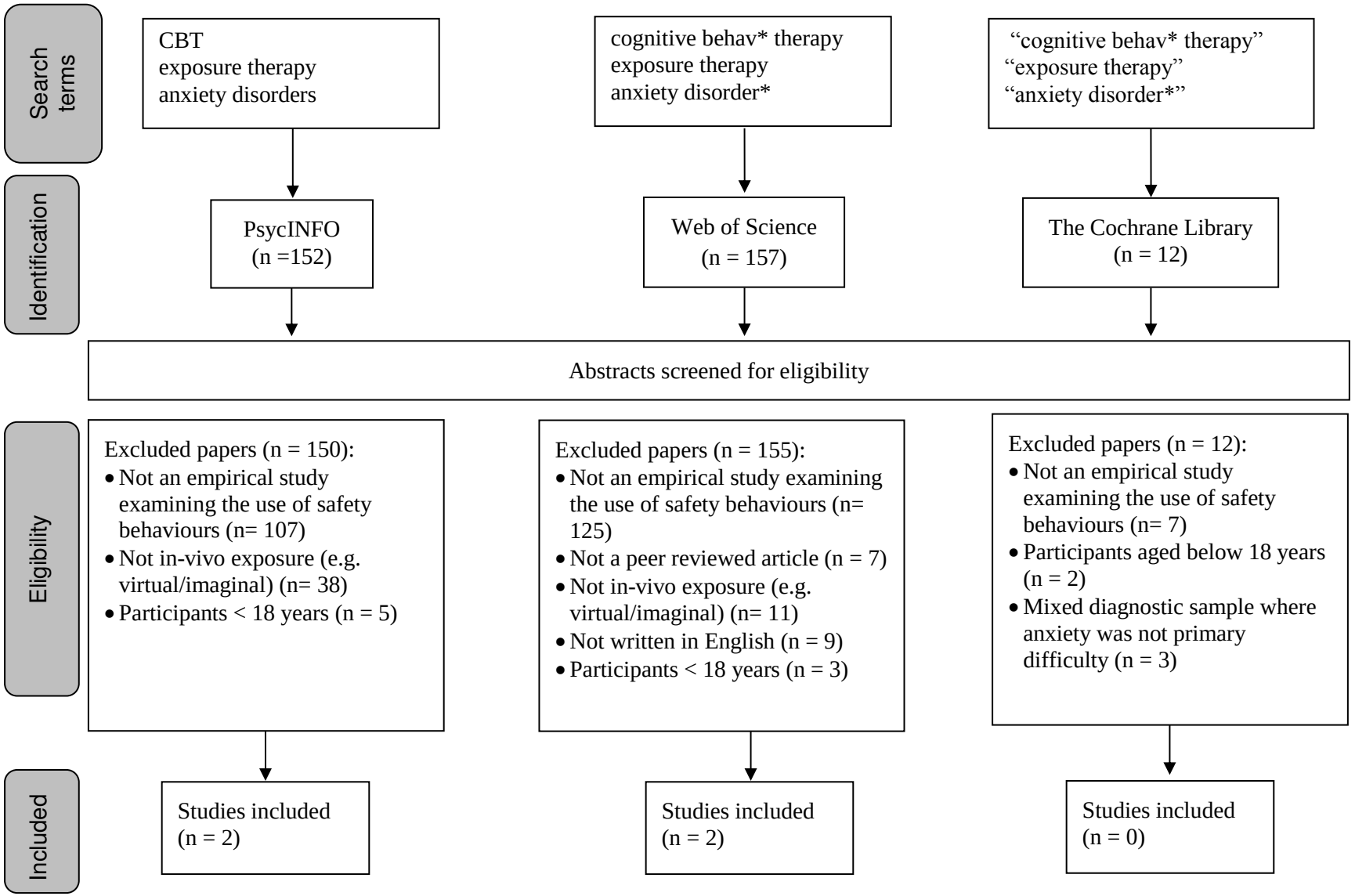

Figure 1. PRISMA flow diagram (Moher, Liberati,Tetzlaff & Altman, 2009) showing the selection process from the electronic database search.

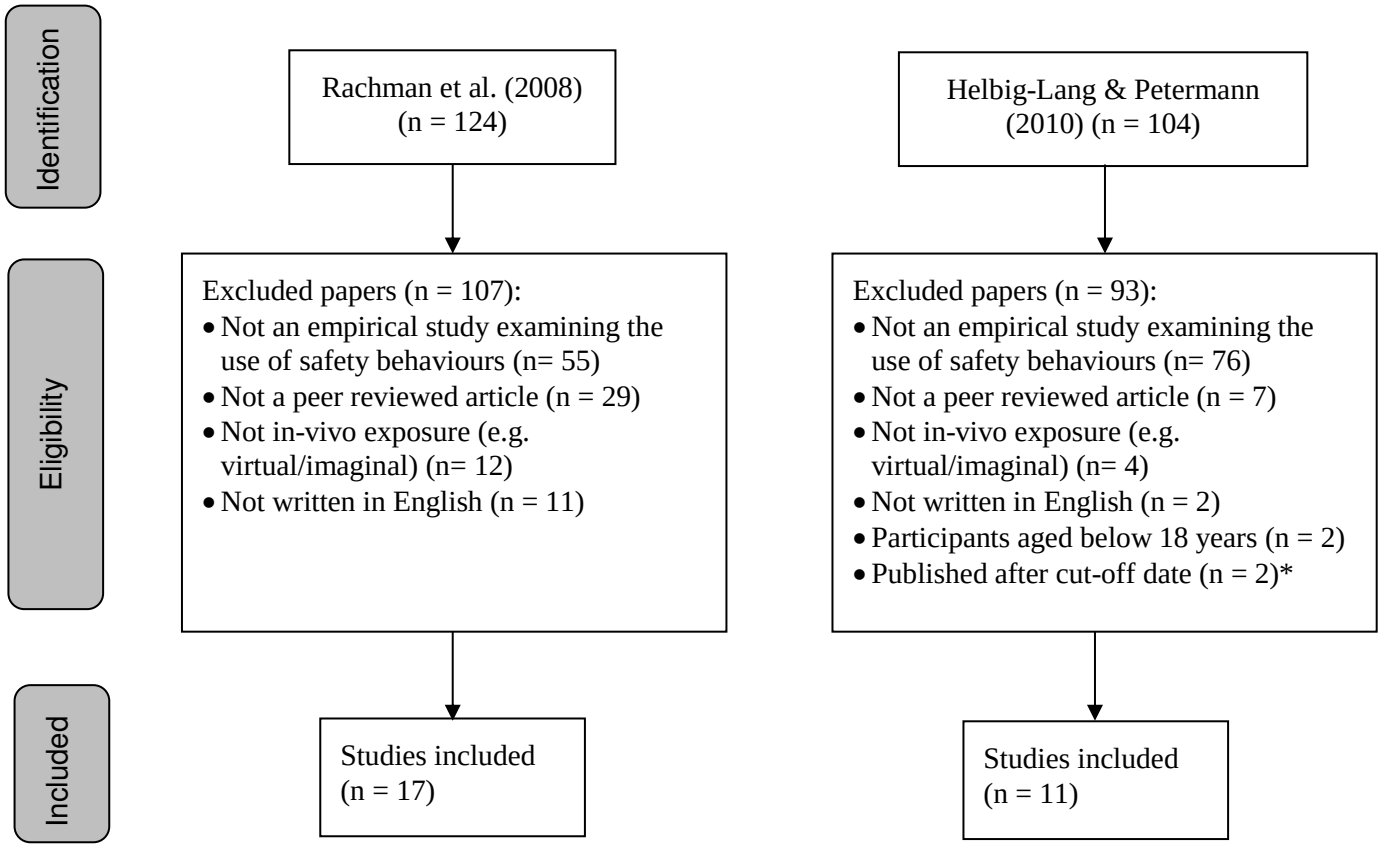

Figure 2. PRISMA flow diagram (Moher et al., 2009) showing the selection process from the search of the references and citations from two key papers.

* the literature search included studies up to an including 31 August 2014. Two citations were identified that were due to be published after this date: Helbig-Lang et al. (2014) and Goetz and Lee (2015).

A total of 32 studies were identified. However, ten studies were duplications and one study was duplicated twice, leaving a total of 21 studies. All papers were read and evaluated according to a data extraction form developed according to published criteria (Des Jarlais, Lyles, & Crepaz, 2004; Long, Godfrey, Randall, Brettle & Grant, 2002; Schulz, Altman, & Moher, 2010; Appendix A).

4. Results

Table 1 gives an overview of the 21 reviewed studies, which span from 1986 to 2014. Despite being heterogeneous in terms of design, sample, procedure, and choice of outcome measures, the basic paradigm was the same: in-vivo exposure to feared stimuli with and without the use of SBs. Only Garcia-Palacios and Botella (2003) used a single case study design, while the other studies opted for repeated measures or (quasi) experimental designs (with sample size ranging from n = 8 to n = 126). As shown in Table 1, most used student populations that mostly comprised female participants in their 20s, but eight studies used patient participants, most of whom were accessing outpatient clinics. All but one study required participants to engage in 1:1 exposure trials/session(s); Morgan and Raffle (1999) conducted group treatment. Six studies focussed on social phobia, four studies on contamination fears, four on claustrophobia, three on agoraphobia/panic, two on spider phobia, one on hypochondriasis, and one on snake phobia. Outcome measures included subjective self-rating scales, (un)standardised questionnaire scores and performance on behavioural approach tests (BATs).

Table 1
Overview of the 21 reviewed papers

Study	N (female)	Sample (anxiety)	Design (follow up)	Exposure paradigm	Outcome measures	Results
Abramowitz & Moore (2007)	27 (21)	Patients presenting at clinic (hypochondr-iasis)	Quasi-experimental uncontrolled (non-applicable)	Exposure to idiosyncratic trigger with 60mins response prevention. SB group given additional unlimited time to engage in SBs.	Anxiety 0-8; urge ratings to performs SBs 0-8.	E group anxiety ratings sig. higher than E+SB group through 45mins of exposure. E group urges to perform SBs sig. higher than E+SB group through 45mins of exposure. Decline in E group appeared functionally equivalent to spontaneous decay aimed at in therapy.
Deacon et al. (2010)	33 (28); M=20yrs ±1yr	Undergraduate students (claustrophobia)	Quasi-experimental uncontrolled; one week	Six trials in claustrophobia chamber.	Fear rating 0-100; BAT; The Claustrophobia Q'aire (CLQ); The Claustrophobia Coping Self-Efficacy Scale (CCSES); The Claustrophobia Concerns Q'aire (CCQ); Anxiety Sensitivity Index-3 (ASI-3).	Non-sig. between-group differences on fear rating, and CLQ pre-post ratings, CCSES, CCQ and ASI-3. E+SB sig. greater improvement in CLQ post-treatment to follow up, than E group. Non-sig. between group differences on clinically significant change, control over reactions, pace of improvement, ratings of treatment acceptability, treatment aversiveness and wish to stop treatment.
Garcia-Palacios & Botella (2003)	1 (1)	Patient accessing anxiety clinic (social)	Single case study	45min session with use of SBs, 10 days self-exposure, 45 min session without use of SBs, 10 days self-exposure.	Self-rated avoidance, anxiety, performance & visibility of shaking to others 0-10	All measures: dropping SBs produced sig. greater improvement than using SBs.
Hood et al. (2010)	43 (40) M=24yrs	Undergraduate students (spider)	Quasi-experimental	Approach to Chilean Rose	Fear of Spiders Q'aire (FSQ); Spider Phobia	Non-sig. between group differences on approach distance. E group

	±7yrs		uncontrolled (one week)	Tarantula	Beliefs Q'aire (SBQ); Spider Self-efficacy Scale (SSES); Depression Anxiety Stress Scale (DASS-21); BAT; SUDs	maintained gains in approach at follow-up, E+SB group sig. decrease in approach at follow-up. Non-sig. between group differences on FSQ, SSES, SBQ, and rate of fear reduction. At post-treatment, E+SB group approached spider sig. quicker than E group.
Kim (2005)	45	Undergraduate students (social)	Quasi-experimental uncontrolled (non-applicable)	Giving a presentation	Anxiety and belief ratings 0-100	E groups sig. lower anxiety ratings than E+SB group. E group with cognitive rationale sig. lower anxiety than E group with extinction rationale. Non-sig. between group difference on belief ratings. Sig. positive correlation between SB use and anxiety rating, and SB use and belief rating.
Levy & Radomsky (2014)	81 (59) M=24yrs ±8yrs 11 excluded from analyses	Undergraduate students (contamination)	Repeated measures counter-balanced (non-applicable)	Exposure to four contaminants (bedpan, dirt mixture, dirty laundry and toilet) with and without the use of SBs.	BAT; Endorsement and Discomfort Scale (EDS); SUDs 0-100	Anticipatory and peak SUDs sig. lower in E+SB group compared to E group. SB group completed sig. more BAT steps than E group.
McManus et al.(2009)	34 (15) M=31yrs	Patients accessing clinic (social)	Repeated measures counter-balanced	Exposure to idiosyncratic social situation with and without the use of SBs and self-attention	Social Phobia Weekly Summary Scale (SPWSS); VAS ratings of anxiety, self-perception, social fears & overall performance	Sig. worse self-ratings when using self-focus and SBs on all four VAS ratings. SPWSS data was analysed after entire session rather than before and after use of SBs.
McManus et al. (2008) study 2	20 (13)	Analogue population non-patient adults	Repeated measures counter-balanced	Two 5min conversations	Self: anxiety 0-100, occurrence of negative prediction, 0-100, self-focus -50 to +50,	Self: sig. higher level of anxiety, sig. more anxious sig. greater belief in negative prediction and sig. worse overall performance using

					overall performance, -50 to +50. Blind rater: enjoyable conversation 0-100, how anxious they appeared 0 -100, overall performance -50 to +50, how likeable they were -50 to +50.	SBs and self-focus than without. Blind rater: sig. more enjoyable conversation, sig. more anxious appearance, sig. better overall performance and sig. more likeable without use of SBs and self-focus than with.
Milosevic & Radomsky (2008)	62 (48) M=26yrs ±8yrs	Undergraduate students & community (snake)	Experimental (non-applicable)	45min exposure therapy to live ribbon snake	Fear of snakes questionnaire (FSQ), BAT, SUDs, Agoraphobia Cognitions Q'aire for Snake Phobia (ACQ-S); Body sensations q'aire (BSQ)	Non-sig. between group differences after exposure on all measures. E+SB group approached sig. closer than E group in 1st 15mins of exposure (non-sig. in 2nd and 3rd 15 mins).
Milosevic & Radomsky (2013)	126 (116) M=23yrs ±6yrs	Undergraduate students & community (spider)	Experimental (non-applicable)	Distance to live Chilean Rose Tarantula in clear terrarium; 20min behavioural experiment	Fear of spiders q'aire (FSQ); BAT; SUDs; Anxiety Control q'aire revised (SCQ-R); Spider phobia beliefs q'aire (SBQ); self-efficacy rating.	Non-sig. between group differences on FSQ, BAT, SUDs, SBQ, and self-efficacy ratings. Control group sig. improvement on ACQ-R compared to E+SB group. E+SB group sig. lower ratings of strength of chosen negative belief compared to E group.
Morgan & Raffle (1999)	30 (14)	Patients accessing tertiary anxiety clinic (social)	Quasi-experimental uncontrolled (non-applicable)	Two speech tasks	Social phobia & anxiety inventory (SPAI); Fear of negative evaluation scale (FNE); anxiety dimension of symptom checklist 90-reivsed (SCL-90-R); SUDs	Effect size indices of the SPAI were significantly greater in the E compared to E+SB group. Effect size indices of FNE and SCL-90-R non-sig. between-groups.
Powers et al. (2004).	72 (62) M=21yrs	Undergraduate psychology	Experimental (two weeks)	Six 5min trials in claustrophobia	The claustrophobia q'aire: suffocation fear	CLQ-SS and CLQ-RS: E group sig. outperformed E+SB use and E+SB

	±5yrs	students (claustrophobia)		chamber 10mins apart	subscale (CLQ-SS) and restriction fear subscale (CLQ-RS); BAT1 fear; BAT2 fear.	availability. BAT1 fear: placebo sig. outperformed waiting list, 3 active groups sig. outperformed placebo, E group sig. outperformed E+SB use and E+SB availability. BAT2 fear: 3 active groups sig. outperformed placebo; E group sig. outperformed E+SB use and E+SB availability. Follow up relapse: E group: 0%, E+SB use: 13%, E+SB availability: 18% placebo/wait list: 20%
Rachman et al. (1986).	14 (10) M=39yrs Range: 27-54yrs	Patients accessing outpatients clinic (agoraphobia)	Quasi-experimental uncontrolled (three months)	8 in vivo therapy sessions	Beck Depression Inventory, agoraphobia subscale of phobia scale, Chambless mobility inventory; BAT, self-rated fear, danger, control, safety & urge to leave 0-100	Non-significant between group differences post-treatment and at follow up.
Rachman et al. (2011)	80 (60)	Undergraduate students (contamination)	Experimental (non-applicable)	Exposure to one of six contaminants rated as most contaminated. 20 trials in session 1, 10 trials in session 2	0-100 self-rated contamination, disgust, fear & danger.	E+SB group sig. lower contamination than E group. Return of all four variables sig. higher in E+SB group than E group.
Salkovskis et al. (1999).	18 (14)	Patients accessing mental health service (agoraphobia & panic)	Experimental (non-applicable)	15mins exposure: either habituation rationale and use of SBs or cognitive rationale without	BAT, anxiety rating 0-100, belief rating 0-100, Beck Depression Inventory (BDI), Beck Anxiety Inventory (BAI), modified fear	E group sig. lower anxiety and belief rating than E+SB group. BDI sig. lower in E group than E+SB group. Non-sig. between group differences on BAI. E group sig. lower panic frequency than E+SB

				use of SBs	q;aire: cognitions scale and avoidance scale, panic frequency.	group. Fear cognitions sig. better in E group than E+SB group, non-sig. difference for avoidance scale.
Salkovkis et al. (2006).	16	Patients accessing mental health service (agoraphobia & panic)	Quasi-experimental uncontrolled (non-applicable)	3.5 hour exposure session	Beck Depression Inventory (BDI), Beck Anxiety Inventory (BAI), modified fear q;aire: cognitions scale and avoidance scale, modified Chambless Agoraphobia q'aire, panic frequency, BAT	E group improved sig. more than E+SB group on BAI, agoraphobic avoidance, frequency of agoraphobic cognitions, believability of agoraphobic cognitions, frequency of panic & BAT steps. Non-sig between group difference on BDI
Sloan & Telch (2002).	46 (43) M=20yrs ±5yrs	Undergraduate psychology students (claustrophobia)	Experimental (two weeks)	Six 5min trials 10mins apart	The claustrophobia q'aire: suffocation fear subscale (CLQ-SS) and restriction fear subscale (CLQ-RS); heart rate, clinical sig. change, length of time in BAT1, length of time in BAT2	Post-trials: E group and control group sig. better than E+SB group on peak fear, BAT1 and BAT2. E group sig. better than control and E+SB group on restriction scale. E group sig. better than E+SB group on suffocation scale, non-sig. compared to control. Non-sig. differences between groups on heart rate. Clinically sig. change: E-100%, E+SB-44%, control=77% Follow up: E+SB group sig. worse results on fear, BAT1, BAT2, and restriction scale than E group, non-sign between group differences on remaining measures. Clinically sig. change: E-100%, E+SB-38%, control-73%
Sy et al.(2011)	58 (45) M=19yrs ±2yrs	Undergraduate psychology students (claustrophobia)	Quasi-experimental uncontrolled (non-	Six 5min trials in claustrophobia chamber 10mins apart	The claustrophobia q'aire: suffocation fear subscale (CLQ-SS) and restriction fear subscale	CLQ & BAT fear: non-sig. between group differences. CCSES: E+SB use sig. better than E group pre-post. All other results

			applicable)		(CLQ-RS); The Claustrophobia Coping Self-Efficacy Scale (CCSES); Claustrophobia concerns q'aire (CCQ); BAT fear ratings; VAS ratings for attribution of non-occurrence of feared prediction	non-sig between group differences. CCQ: non-sig. between group difference for E group, E+SB use group and E+SB availability group. E+SB use sig. better pre-post change than E group.
van den Hout et al. (2011)	44 (36) M=24yrs ±2yrs	Undergraduate students (contamination)	Experimental (non-applicable)	Two 20 trial sessions of exposure to one of six contaminants rated as most contaminated	Self-ratings of contamination, fear, disgust and danger 0-100	Session 1: E+SB group sig. better than E group. Time course of effects non-sig. between groups on all variables. Non-sig. difference in contamination rating of unused contaminants.
van den Hout, et al. (2012)	48 (31) M=24yrs ±6yrs	Undergraduate students (contamination)	Quasi-experimental uncontrolled (non-applicable)	45 min session composing of 20 trials of exposure to one of six contaminants rated as most contaminated	Self-ratings of contamination, fear, disgust and danger 0-100	Non-sig. between group differences on ratings of fear, disgust and danger.
Wells et al. (1995)	8 (5) 24-53yrs	Patients (social)	Repeated measures partial counter-balanced	5-10 mins of exposure to idiosyncratic social situation	Anxiety, strength of belief, & treatment effectiveness 0-100	Sig. better anxiety rating, strength of belief ratings and treatment effectiveness when not using SBs compared to using SBs.

SBs= safety behaviours. E= exposure without the use of SBs, E+SB= exposure with the use of SBs, BAT=behavioural approach test; SUDs= subjective units of distress; VAS= visual analogue scale; sig. = significant(ly).

4.1 Single Case and Repeated Measures Studies (n = 5)

Garcia-Palacios and Botella's (2003) single case study allowed for an in-depth clinical consideration of SB use but the exclusive use of self-report rating measures meant that the dependent variables were subjective. More importantly, the design limited the conclusions and generalisations that could be made.

Four studies built upon this by using repeated measures designs (Levy & Radomsky, 2014; McManus et al., 2009; McManus, Sacadura & Clark, 2008; Wells et al., 1995). Although Wells et al. (1995) also used subjective measures, the others used more objective measures alongside this – such as questionnaires and behavioural approach tests (BATs). McManus et al. (2008) also used blind raters for data collection. Like Garcia-Palacios and Botella (2003), three of these studies attempted to increase sample homogeneity either by recruiting patient participants who met diagnostic criteria (McManus et al., 2009; Wells et al., 1995) or by screening non-clinical participants with a standardised questionnaire (McManus et al., 2008). However, the screening, eligibility and pre-exposure information for Levy and Radomsky's (2014) participants was unclear.

All but one (Levy & Radomsky, 2014) of these five papers advocated for the elimination of SBs with implicit or explicit alignment with cognitive theory and/or the ILM. The four studies together suggested that participants had significantly lower anxiety levels and improved cognition-based scores when they dropped SBs compared to when they used them. However, three of the studies (McManus et al., 2009; McManus et al., 2008; Wells et al., 1995) acknowledged manipulations alongside SB use (such as self-focussed attention or type of rationale given) which confounds the results.

Levy and Radomsky (2014) had a much larger sample size (n = 81) and reported that their participants achieved a significantly greater initial approach to the feared stimulus when using SBs, and rated using SBs as significantly more acceptable than not using them. This

gave tentative support to the EPT-based idea that SBs might play a role in lowering anxiety so that treatment is tolerable, suggesting that use of SBs might play a helpful role in targeting the high refusal and drop-out rates in anxiety treatment.

The discrepancy between these studies might be explained by the design and adherence to SB manipulation. Given that SB use is hypothesised to help those who find not using SBs too daunting (and therefore refuse therapy), it would mean that SBs play a role at the beginning of therapy. However, all but Garcia-Palacios and Botella (2003) counterbalanced the use/dropping of SBs so results were not solely based on using SBs and then dropping them. This suggests that between-subjects designs might be better suited to investigating the role of SBs.

Also important is the extent to which the SB manipulation was successful. As already stated, some studies were not aiming to only manipulate SBs, which confounded the results. Further, only three studies (Garcia-Palacios & Botella, 2003; McManus et al., 2009; Wells et al., 1995) identified idiosyncratic SBs that were linked to their function (Thwaites & Freeston, 2005); prescribing which SBs to use risks the behaviours not being used as safety-strategies. Moreover, it is possible that participants in either condition would use subtle (or covert) SBs or SBs that were not formally recorded as part of the study. However, information about additional/covert SB use was only reported by McManus et al. (2008). They state that participants had a significantly higher compliance with instructions when using SBs compared to when not using SBs. Thus there was a lack of evidence that the SB manipulation was implemented sufficiently by the researchers, and then adhered to sufficiently by the participants, which creates fundamental doubts about the evidence of the role of SBs provided by these studies. Although there was more support for role of SBs as being unhelpful, this is only based on five studies so far.

4.2 Between-group Studies: without Control and Follow-up (n = 6)

The remaining studies used between-subjects designs. Six studies collected pre/post exposure data without the use of non-exposure control groups or follow-up data, but they did randomise participants (Abramowitz & Moore, 2007; Kim, 2005; Morgan & Raffle, 1999; Salkovskis, Hackmann, Wells, Gelder & Clark, 2006; Sy, Dixon, Lickel, Nelson & Deacon, 2011; van den Hout, Reininghaus, van der Stap & Engelhard, 2012).

Abramowitz & Moore (2007) and Salkovskis et al. (2006) had robust criteria for recruiting a more homogenous (patient) sample, compared to Sy et al. (2011) who had a mix of clinical and non-clinical participants within their sample, and Morgan and Raffle (1999) who had some participants that were using psychotropic medication, and others who met comorbid diagnoses. While Abramowitz and Moore (2007) also used a multi-stage eligibility and screening process involving standardised interviews and questionnaires, their outcome measures were limited to subjective self-report ratings, as were Kim's (2005) and van den Hout et al.'s (2012). Morgan and Raffle (1999) used self-report ratings alongside more objective standardised measures; however, they collected data on four anxiety measures and received mixed results. Other curious outcome measure choices included a depression scale (Salkovskis et al., 2006) and a cognitive measure for a study predicated on the EPT (Sy et al., 2011). This raises the question of what a good outcome looks like when investigating the role of SBs within in vivo exposure.

Outcome measures are partly influenced by theory. For example, a study based on EPT might want to measure anxiety experienced by participants at regular time points throughout the exposure session/trial (to evidence within-session decreases in anxiety). A study based on the ILM might instead measure the ability of participants to be in the presence of their feared stimuli - for example, by using a behavioural approach test, or be interested in pre-post/follow-up changes in anxiety scores. Thus what is measured (anxiety, strength of

cognitive beliefs, approach to a feared stimulus) and how outcomes are measured (subjective self-report, general anxiety questionnaire, specific phobia questionnaire, behavioural performance) are integral to identifying the role of SBs. If the role of SBs is to reduce anxiety, it might be irrelevant to measure cognitive change; moreover, we might be arguably more interested in a behavioural approach test result because this might be considered a more ecologically valid way of assessing the extent to which a participant has overcome their fear, than a questionnaire result or change in subjective units of distress.

As with the single case and repeated measures studies, the between-subjects studies that advocated for the elimination of SBs were also the studies that explicitly or implicitly aligned with cognitive theory and the ILM. Anxiety consistently decreased during the exposure interventions regardless of whether SBs were used or not, but the tension is firstly, whether the use of SBs can achieve equivalent/lower anxiety levels than not using SBs, and secondly, whether the way in which anxiety decreases is sustainable. The two studies focussed on the former reported non-significant between-group differences on fear ratings (van den Hout at al., 2012) and BAT fear (Sy et al., 2011), although both studies had predicted superior results for those using SBs. It is unclear whether EPT would necessarily differentiate between whether SB use is equivalent or superior to non-SB use because the aim is to achieve lowered (presumably, non-clinical levels of) anxiety. Again, this raises the issue of appropriate outcomes. Although Sy et al. (2011) could argue that SB use did not seem to harm the reduction in anxiety based on their ecologically valid BAT, there is a lacking emphasis on how much of the BAT participants could complete (in favour of how participants felt doing the BAT). Comparing between-group BAT completion rates post-exposure would be inappropriate in this study however because 83% of participants could complete the BAT at baseline.

In contrast, both of Salkovskis et al.'s (2006) groups had low baseline scores on all dependent variables. They reported significantly lower anxiety, panic and situational avoidance, and, significantly higher BAT progress for participants who did not use SBs, compared to those that did. The BAT result in particular provides strong support for the cognitive theory that SBs prevent a reduction in the strength of negative interpretations or beliefs about a feared stimulus. The consequences of this potentially includes incomplete habituation and lowered ability to be in a feared situation. The authors acknowledged that SB use was manipulated alongside rationale (habituation versus cognitive) and that this confounded results.

Slightly different to this, Abramowitz and Moore (2007) concluded that the group that did not use SBs had higher anxiety than the group that did until the last 10 minutes of the 60 minute session, but the group that did not use SBs demonstrated a decline in anxiety that resembled a 'natural' habituation (rather than the 'coerced' habituation that was explained in Section 2.4). This supports Craske et al.'s (2008) model (ILM): that it is end-of-session anxiety that is more important than anxiety levels during in vivo exposure, and thus SBs providing an immediate anxiety reduction is not helpful. However, as there was no follow-up, it is unknown how the groups performed long-term and this is crucial for understanding what impact SBs have on strengthening the alternative fear structure.

Overall, the tentative impression emerging is that SBs may provide a quick reduction in anxiety. This might be explained by EPT which proposes that exposure should aim for within- and between-session habituation; therefore, if SBs lower anxiety, it could help to facilitate habituation. This is important for advocates of the judicious use of SBs during in vivo exposure because SB-use is hypothesised to make therapy accessible to people who find the elimination of SBs too daunting. However, the query is whether lowered anxiety is representative of over-coming an anxiety disorder. The performance-based BATs that have

been more used by the advocates of the elimination of SBs seem to give a more convincing demonstration of the extent to which someone has overcome their fear. For example, an agoraphobic patient might feel less anxious in a supermarket – demonstrating lowered anxiety as per EPT. However, a more convincing demonstration would be how much of their shopping they can do in the supermarket – demonstrating the decreased strength of their negative beliefs, as per cognitive theory. Alternatively we could measure how anxious they feel once they've finished their shopping – demonstrating the importance of 'outcome' anxiety rather than 'process' anxiety as in ILM, and their ability to then leave the house to meet friends in a bar – demonstrating the generalizable strength of the alternative fear structure in ILM. Van den Hout et al. (2012) demonstrated how this can be empirically tested by assessing generalisation of gains. They found that contamination scores significantly decreased within-groups for objects that did not feature in their exposure trials (indicating that exposure gains did generalise to other 'contaminated' objects). However, they found non-significant between-group differences in generalisability. However, as with the first five studies reviewed, these findings are dependent on the extent to which SB-use was sufficiently manipulated by the researchers and sufficiently adhered to by the participants.

While there was a consensus that SBs are individual to each person, only Abramowitz and Moore (2007) identified idiosyncratic SBs linked to function with their participants; Salkovskis et al. (2006) was the only study not to report what the SBs were. The issue of covert/additional SBs was only addressed by three out of this group of six studies. Abramowitz and Moore (2007) designed a protocol to minimise the chance of covert SBs but were only able to report anecdotally that they were not used. Kim's (2005) study was also limited by the use of a nine-item questionnaire check for SB use; therefore, only a between-group difference in SB use could be reported. A more thorough check by Morgan and Raffle (1999) identified that 85% and 67% of the group not meant to use SBs used them on days

three and nine respectively. Thus evidence for successful SB manipulation continued to be lacking.

4.3 Between-groups Studies: with Control (n = 5)

In addition to the confounding variables identified in some of the above studies, none of them used control groups, which reduced the extent to which the effects of SBs could be attributed to this independent variable. Although five studies reported the use of a control group (Milosevic & Radomksy 2008; 2013; Rachman, Shafran, Radomsky & Zysk 2011; Salkovskis, Clark, Hackmann, Wells & Gelder 1999; van den Hout, Engelhard, Toffolo & van Uijen 2011), four of them defined this as simply exposure without the use of SBs compared to exposure with the use of SBs, whereas van den Hout et al. (2011; a replication of the Rachman et al., 2011 study) compared exposure with and without the use of SBs, and had an additional non-exposure control group. Thus the improvement on the use of control groups was small. Further methodological limitations included manipulation of rationale alongside manipulation of SB use (Salkovskis et al., 1999), potential floor and ceiling effects, subjective self-report ratings as the only dependent variables, and no reported information about eligibility, screening, and pre-exposure participant performance (Rachman et al., 2011; van den Hout et al., 2011). There were methodological improvements on sample size in four studies (ranging from n = 44 to n = 126) although Salkovskis et al. (1999) n = 18. In particular, Milosevic & Radomsky (2013) was the only study to calculate an a priori sample size (n = 126) and their 2008 study used a blinded data collector.

Safety-signal theory had a stronger presence in these studies. Milosevic and Radomsky (2013) predicted better self-efficacy and perceived control for those that used SBs; they found non-significant between-group results for self-efficacy, but those that did not use SBs had significantly higher perceived control scores. Van den Hout et al. (2011) predicted superior perceived control over feelings of contamination, fear, disgust and danger for the

group using SBs, but found a significant difference in control over just disgust in session one only (the van den Hout (2012) study referred to in the section above found no main effect of perceived control). There was thus weak evidence that SBs improved control and self-efficacy as underpinned by safety-signal theory from these studies.

While the group that used SBs were able to approach the feared stimulus significantly closer than the group that dropped SBs in Milosevic and Radomsky's (2008) study, this only applied to the first 15 minutes of the 45 minute session. As they predicted, this supports the immediate impact that SBs can have during in vivo exposure, but the non-significant between group differences in the second and third 15 minutes question how useful this is.

4.4 Between-group Studies: with Follow-up (n = 3)

It has been consistently noted that without follow-up data, the longer-term role of SBs during in vivo exposure cannot be identified. There were three studies that conducted follow-up analyses, but without use of a control group (Deacon, Sy, Lickel & Nelson, 2010; Hood, Antony, Koerner & Monson, 2010; Rachman, Craske & Tallman, 1986). There were continued methodological limitations as described above; for example, differences within the sample regarding use of psychotropic medication (Rachman et al., 1986), comorbid diagnoses (Hood et al., 2010) and mix of clinical and non-clinical participants (Deacon et al., 2010; Hood et al., 2010). Eighty five percent of participants in Deacon et al.'s (2010) study could complete the BAT pre-treatment and only half of the group that were meant to use the prescribed SBs did. Thus the information from these papers was treated with due caution.

It was earlier stated that Abramowitz and Moore's (2007) results supported their hypotheses: those using SBs experienced immediate reduction in anxiety and urges to perform SBs, those not using SBs experienced a more gradual decline, which was argued to mean that the use of SBs creates short term, unsustainable gains. Hood et al's (2010) results supported this because the group that used SBs approached the feared stimulus more quickly

than the group that did not use SBs. However, at follow up, those using SBs showed a significant decrease in approach to the feared stimulus.

Deacon et al. (2010) also predicted that SBs would facilitate significantly better improvement at the beginning but found non-significant between group differences in how quickly participants approached the feared situation or the rate of improvement based on peak fear ratings and questionnaire responses. Incidentally, Deacon et al. (2010) also predicted that participants would find SB use more tolerable, which would fulfil the role of initiating treatment but participants using SBs did not give significantly better ratings than non-SB users on acceptability, aversenesss, and wish to stop treatment.

Rachman et al. (1986) collected three month follow-up data (compared to one week follow-up data for the other two studies) and was one of the few studies that clearly and explicitly grounded the aims and hypotheses in theory. Rachman et al. (1986) allowed half of their participants (n = 7) to 'escape' during exposure for agoraphobia (the other half were instructed to remain) and concluded that escape behaviour did not necessarily maintain agoraphobia. However, they acknowledged the small sample size and the tendency for less symptomatology for the group not using the SB compared to the group using the SB at post-exposure and follow-up. In addition, there were numerous outcome measures with increased risk of Type I error during analyses, treatment sessions varied between 1.5 and 2.5 hours, 5 out of 14 participants had treatment sessions in between post-exposure data collection and follow-up, and three out of seven participants did not use the escape option (escape was used 13 times in 128 trials).

4.5 Methodologically Strongest Studies (n = 2)

Two studies used a between-subjects design, included a control group and follow-up analyses two weeks after the exposure session (Powers, Smits & Telch, 2004; Sloan & Telch, 2002). They used one BAT as a pre/post/follow-up measure, and a second (different) BAT to

investigate generalisation of gains. Powers et al. (2004) was the only study to use an exposure only group, exposure with SBs group, non-exposure control group, as well as an active placebo group, and a fifth group of participants who had SBs available to them, but were instructed not to use them. This study demonstrated the effects of nonspecific factors in therapy, the importance of meaningful control and placebo groups, and the potential for SB availability to be equivalent to SB use. The group that did not use SBs performed consistently better than the remaining groups post-exposure and follow-up. Sloan and Telch (2002) found that the group not using SBs performed better than the group that did on most measures post-exposure and follow-up as well. Sloan and Telch (2002) monitored heart rate to show a lack of evidence for EPT as an underlying theory for successful exposure work, while Powers et al. (2004) focussed on the evidence for cognitive theory.

These studies demonstrated the benefits of a strong design, relevant outcomes and clear theoretical underpinnings, which is ultimately about equipping clinicians with the tools to help: "those of us engaged in ...research need to pay greater attention to the question, 'Do our research findings offer clinicians anything useful that may assist them in working with real patients in the real world?'" (Sloan and Telch, 2002, p. 250). Thus the role of safety behaviours is essentially about the extent to which they help or impede recovery from anxiety. EPT is perhaps overly focussed on anxiety going down, without due consideration to the difference this makes to the person's recovery. Thus, while SBs seem to play a role in reducing anxiety in the short-term, there is a lack of evidence that this is sustainable or indeed helpful. The studies underpinned by safety-signal theory also demonstrated weak evidence that SBs can facilitate improved self-efficacy and control. Cognitive theory and the ILM are arguably more geared towards the aim of 'helping real patients in the real world'. While there was evidence that SBs can interfere with the reduction in the strength of negative

beliefs/interpretations and prevent robust alternative fear structures, the evidence was limited by methodological weaknesses.

5. Discussion

This paper set out to review the evidence for the role of SBs within exposure therapy for anxiety. Theoretical underpinnings were acknowledged because this was a gap in previous reviews, and a current gap in considering the evidence-base of anxiety treatment generally. A systematic search revealed 21 studies, all of which collected a minimum of pre-post data for in vivo exposure to a feared stimulus/situation. Numerous methodological shortcomings were identified with particular reference to control groups, follow-up data, a priori power calculations, sample heterogeneity, numerous/non-representative outcome measures, high Type 1 error risks, and poor SB manipulation and/or participant adherence to study instructions. The need for more robust research was acknowledged by most of the studies and recommendations for future research are given in Section 5.1.

In terms of the research questions, a consistent finding was that SBs can lower anxiety, but the helpfulness of this was perhaps negated by the lack of long-term gain. Another predicted main advantage was that using SBs would engage clients who ordinarily refuse or drop-out of therapy. While evidence for this was weak, there was evidence that SB use can provide short term gains – namely approaching a feared stimulus faster and more closely (than those not using SBs). However, the practical significance of this is questioned. Given that the gains lasted for the first 10-15 minutes of a first session, this is unlikely to influence therapy take-up rates. Besides, only one study (Levy & Radomsky, 2014) found that participants rated SB use as significantly more acceptable than not using SBs indicating that dropping SBs might not necessarily be a barrier to undertaking exposure.

Overall the impact on anxiety levels became less relevant without evidence of what the participants could actually achieve (e.g. via a BAT). Thus it was not just the limited evidence

supporting the role of SBs as underlined by EPT, it was the limited usefulness of lowering anxiety during in vivo exposure that emerged. Similarly, there was weak evidence that SBs enabled greater self-efficacy and control (as per safety-signal theory), but also weak evidence that this helps people to overcome their anxiety disorder. Studies that mentioned systematic desensitisation or two-stage theory did so as a historical context, which suggested that these theories were not considered to account for the role of SBs in the current evidence base.

A consistent finding was that SBs prevent weakened negative beliefs, or positive alternative interpretations about the feared stimulus at post-treatment and follow-up, and secondary to this, meant that anxiety levels were still high. The studies that recorded change over time demonstrated volatile fear ratings for those that used SBs and for some, the fear ratings increased at the end of the exposure trial(s). In comparison, those that did not use SBs demonstrated the gradual decline defined by habituation.

In the same way that theory is being focussed on to help identify the roles of SBs, a greater consideration of theory might help to address methodological shortcomings. For example, it was observed that many outcome measures were used within each study. This was perhaps motivated by wanting to address the differing theoretical underpinnings that emphasise either the importance of lowered anxiety, reduced estimations of threat, and/or alternative meaning, as well as safety cues and self-efficacy. It seemed that several incongruent theories underlined methodological decisions at times and this led to avoidable confounding factors and problematic statistics.

Chronology is also an issue. Extinction is a behavioural term that was traditionally achieved by behavioural techniques based on behavioural models and theories. However, in current CBT models, extinction now seems to be understood as a behavioural aim achieved secondary to weakened negative beliefs, by varying techniques based on differing models and theories (Beck, 2011). This has perhaps confused the clarity with which SBs are investigated.

The reviewed studies were in keeping with recent suggestions that less attention has been given to the link between theory and research (Reese et al., 2013), which is a novel consideration when reviewing the role of SBs within exposure therapy. Any explicit reference to theoretical orientation within the studies tended to name cognitive theory and cognitive models; it was usually necessary to infer the theoretical basis for the study being undertaken.

As the concept of safety behaviours and how to distinguish them from coping strategies has been discussed in detail before (e.g. Helbig-Lang & Petermann, 2010; Thwaites & Freeston, 2005), it won't be discussed here. However, there was a noticeable lack of these considerations in the 21 reviewed studies which reduced the overall construct validity. The most important consequence of this was the reported high rates of covert/additional SB use by those not meant to be using SBs or poor take-up of SBs offered to the SB groups. Given that mere SB availability (not just use) can impact upon the exposure process (Powers et al., 2004), it was clearly demonstrated by these studies that SBs require meticulous assessment and checks.

Overall, the evidence suggested that the role of SBs within anxiety disorder treatment changes over time. Although they seem helpful at the start of exposure, these gains are not maintained at post-treatment or follow-up. It was also suggested that SB availability can play just as strong a role as SB use, but further replication of this finding is needed. Evidence that the role of safety behaviours is linked to self-efficacy was poor.

The role played by SBs seems to reflect clinical observations that clinical beliefs and anxieties are not on/off switches: they change according to the context that person is in and the particular details of the feared situation/stimulus. Similarly, the particular SBs used by clinical groups are likely to vary between people and can be very idiosyncratic, meaning that the role that SBs play can vary too.

5.1 Future Research

Aside from identifying the evidence for the role of SBs, an important outcome was to give clear, concrete direction to future research. While comprehensive guidelines for randomised-controlled trials should aim to be followed (e.g. Schulz et al., 2010), future quantitative research should particularly consider more robust methodology and greater consideration of how to control and record the use of SBs.

Specific methodological recommendations include a priori power calculations, clear eligibility criteria and thorough screening procedures using standardised measures to recruit homogenous samples, a minimum of three conditions: exposure without SBs, exposure with SBs, and a control/placebo condition, random allocation to conditions, and follow-up data (between-groups designs were able to empirically test the role of SBs better than other designs). Outcome measures that specifically link to underpinning theory and predictions, and that are able to measure the extent of recovery would also improve the quality of the conclusions that can be drawn. It would also prevent the use of numerous outcome measures, which can be theoretically inaccurate, increase the risk of Type I errors, and distract from what progress actually looks like.

This review also calls for a change in the way that the roles of SBs are investigated. While protocols and standardisation are vital to internal validity, there is a need for more idiosyncratic, formulation-driven studies. This would allow for the identification of idiosyncratic, overt and covert SBs that are assessed according to function in the particular study scenario. It would also encourage testing of the specific mechanisms behind the role of SBs.

There is also a need to match the concept of SBs with the study design. The evidence suggests that SBs have both short- and long-term roles, the latter of which have not been adequately investigated. Future research should therefore aim for long-term longitudinal

research as well as testing the depth and generalisability of gains. For example, van den Hout et al. (2011; 2012) collected contamination ratings for objects that had not featured in the exposure trials. This would improve both construct validity and ecological validity.

5.2 Limitations

While the 21 studies reviewed were all relevant and informative, there are several considerations in terms of how representative the search was. The range of keywords and terms used to investigate the role of SBs, means that some relevant studies may have been omitted, although this was prevented as far as possible by conducting a systematic search. It is also possible that further information might be amongst the literature using other forms of exposure (e.g. self-guided, virtual, imaginal) and/or studies that did not use exposure at all (e.g. Gangemi, Mancini, & van den Hout (2012) investigated the role of SBs using vignettes).

It should also be noted that factors other than the role of SBs can influence the success of exposure therapy. The quality and nature of the exposure work varied across the studies and likely influenced the results.

A considerable portion of the debate about whether to judiciously facilitate SB use or not has been because of a recognised high refusal and dropout rate within anxiety disorder treatment, as well as questions about how to improve recovery rates. While this kind of empirical research is valuable, it has not been considered alongside other ways of investigating improvements to anxiety treatment – such as how therapists' beliefs influence treatment (Meyer, Farrell, Kemp, Blakey & Deacon, 2014) and how treatment can be improved by involving service-users (Tait & Lester, 2005).

6. Conclusion

The evidence for the role of SBs in exposure therapy is entangled in methodological shortcomings and lacks robust theoretical underpinning. The theoretical lens used in this

review suggests that SBs are more unhelpful than they are helpful for recovery, which is consistent with previous reviews. Whilst details are not elucidated yet, it is clear that SBs influence the outcome of exposure interventions. This influence can be helpful for a short period of time, but appears to prevent completion of cognitive processes.

In order to make more assertive conclusions, this review calls for a change in the way that the roles of SBs are investigated. It is suggested here that the sheer variability in theoretical perspectives and subsequent breadth of choice in terms of study design partly accounts for the conflicting results. Researchers should therefore identify their theoretical underpinning (justified according to the evidence base) and choose outcome measures linked to this (rather than examining anxiety levels and cognitive change and self-efficacy and rate of change). This allows for more streamlined research that in turn allows for more robust methodological decisions. The need for idiosyncratic, function-based SBs was also highlighted, with thorough recording of SB use and comprehensive participant instructions to control for the use of covert SBs.

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The lasting impact of safety behaviours during in vivo exposure for anxiety.

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Abstract

Anxiety disorder interventions usually require in vivo exposure without the use of safety behaviours. However, the literature has started to query whether safety behaviour use is harmful, and whether they might actually help to make therapy accessible for patients who usually refuse or drop-out of treatment.

This study attempted to improve methodology and give greater consideration to the differing underlying theories. It was hypothesised that the role of safety behaviours would be in line with cognitive theory (Salkovskis, 1991) and the inhibitory learning model (Craske et al., 2008).

Thirty-three participants with sub-clinical arachnophobia were recruited from student and community populations. N = 11 completed in vivo exposure without the use of safety behaviours (exposure), n = 11 with the use of safety behaviours (safety) and n = 11 were assigned to the no-exposure control group. Outcomes included two behavioural approach tests and two questionnaires.

Results showed that the exposure group outperformed the safety group at post-exposure and follow-up. It is suggested that the role of safety behaviours is more likely to be underpinned by cognitive theory and the inhibitory learning model (than by emotional processing theory). However, these findings need to be replicated with clinical populations and more research is needed on what appropriate and relevant outcomes look like in anxiety interventions.

Keywords: safety behaviour, exposure, anxiety, inhibitory learning model, cognitive theory

1. Introduction

Anxiety is one of the most common health conditions in Britain (Mental Health Foundation, 2007; Office for National Statistics, 1995) and is recognised as a national target for better health outcomes (Layard, 2006; Clark, 2011). Clinical levels of anxiety are often understood within the context of 'anxiety disorders': a cluster of psychiatric diagnoses listed within the fifth version of the diagnostic and statistical manual (DSM-V; American Psychiatric Association [APA], 2013). A widely accepted feature of anxiety disorders is that people typically engage with avoidance or escape behaviours, also known as 'safety behaviours' which are thought to preclude recovery and maintain the problem (Clark, 1999; Helbig-Lang & Petermann, 2010; Salkovskis, 1991). The empirical evidence endorses tackling the source of anxiety maintenance, which requires clients to face their fear (exposure) and eliminate the use of safety behaviours (Clark, 1999). Such intervention, within a cognitive-behavioural therapy framework, is the nationally recommended psychological intervention for clinical anxiety (National Institute of Health and Clinical Excellence [NICE], 2005; 2011; 2013; 2014).

However, there were early suggestions that safety behaviours are not as obstructive to progress as is theorised (Bandura, Jeffrey, & Wright, 1974; Rachman, Craske & Tallman, 1986). This latter position has recently received more attention (e.g. Helbig-Lang & Petermann, 2010; Parrish, Radomsky, & Dugas, 2008; Rachman, Radomsky & Shafran, 2008) with an increase in the number of empirical studies suggesting that safety behaviours may facilitate a greater engagement with therapy (Levy & Radomsky, 2014; Rachman, Shafran & Radomsky, 2011).

These contrasting positions could partially be explained by methodological issues (see below), and have been discussed in terms of conceptual differences about what a safety behaviour is (Helbig-Lang & Petermann, 2010). Another important consideration is differing

underlying theory about the impact of using safety behaviours and how this creates contrasting aims and outcomes during exposure.

1.1 Theoretical Underpinnings

Behavioural theory suggests that successful exposure should reduce the conditioned response to the feared stimulus/situation to achieve extinction; the desired outcome is lowered anxiety (Abramowitz, Deacon, & Whiteside, 2011). Cognitive theory suggests that the strength of negative interpretations (thoughts, beliefs) about the feared stimulus/situation should be targeted so that threat estimation is lowered (i.e. the combination of the likelihood of threat, the degree of awfulness, the ability to cope and the chances of getting help are at acceptable levels – 'the anxiety formula', Salkovskis, 1996). Modern syntheses of these approaches usually employ cognitive techniques (such as thought records, behavioural experiments) to reduce the strength of the beliefs and subsequently reduce anxiety (Beck, 2011).

However, the associations made with a stimulus are changeable and patients can, and do, relapse. The inhibitory learning model (ILM, Craske et al., 2008) proposes that following exposure, a new, alternative fear structure of the previously feared stimuli is created, which sits alongside the old structure that represents the conditioned fear response. Avoidance would likely activate and strengthen the old fear structure, whereas repeated exposure in different contexts would activate and strengthen the new fear structure. Safety behaviours could thus interfere by strengthening the old fear structure. For example, if someone spends their time looking at their drink and gripping their glass during a conversation with a colleague because of social anxiety, there are several possibilities. It may be that their colleague is smiling and nodding along to the conversation showing their interest but this disconfirmatory evidence, perhaps about being boring or saying something embarrassing will be missed (redirection of attentional resources away from corrective information); or they

might notice their colleague's encouraging smiles and might assume that staring into their drink is a useful strategy (misattributing the non-occurrence of the threat to the safety behaviour). Alternatively, it may be that by avoiding eye contact the colleague perceives it as a sign to disengage the conversation (increasing the likelihood of the feared outcome – 'people won't want to talk to me'). Further, gripping the glass hard enough could cause their hand to shake (increasing symptomatology, and, potentially acting as a danger alert that the situation should be feared).

The emotional processing theory (EPT; Foa & Kozak, 1986; Foa & McNally, 1996; Rachman, 1980) provides an alternative focus. This theory suggests that within- and between-session habituation facilitates successful intervention for exposure. Techniques should therefore directly function to reduce anxiety. Advocates for the judicious use of safety behaviours have demonstrated reductions in anxiety after using safety behaviours (e.g. Milosevic & Radomsky, 2008; Sy, Dixon, Lickel, Nelson & Deacon, 2011). The main justification for allowing the judicious use of safety behaviours is in response to the high refusal and drop-out rates within anxiety intervention, for example in exposure and response prevention for obsessive-compulsive disorder (Rachman, 2004). It has been argued that safety behaviours lower anxiety and thus allow access to exposure therapy where it would previously be too daunting. However, this does not take into account the potential loss of progress later on in the process.

The author's review of 21 empirical studies investigating the role that safety behaviours play during in vivo exposure suggested that safety behaviours interfere with intervention by artificially down regulating anxiety. In the short term, this can facilitate progress – for example approaching a feared stimulus faster (Hood, Antony, Koerner & Monson, 2010) or closer (Milosevic & Radomsky, 2008) than participants not using safety behaviours. However, because the alternative interpretations are subsequently not created or not properly

developed, this is more of a mimic of extinction, rather than genuine extinction. Thus those using safety behaviours could expect a trajectory of initial improvement, followed by decline (because their new, alternative interpretations are weak), whereas those not using safety behaviours could expect a trajectory of continual improvement (because their new, alternative interpretations are being strengthened).

1.2 Current Study

This study planned to build on previous research by addressing previous methodological shortcomings and placing greater emphasis on the theoretical underpinnings of exposure.

The main methodological improvements include a priori power analyses, use of a control group, follow-up analyses and attempts to increase participant adherence to the procedure. These priorities were based on the afore-mentioned review of 21 studies. Whilst these improvements are recommended features of gold standard research (Breakwell, Hammond, Fife-Schaw & Smith, 2006; Critical Appraisal Skills Programme [CASP], 2013; Schulz, Altman, & Moher, 2010; Specialist Unit of Review Evidence [SURE], 2013), they were lacking in previous research and identified as particularly important for understanding the impact of using safety behaviours for several reasons. Firstly, the role of safety behaviours can vary in time (short term to long term), which requires a baseline (control) so that findings cannot be attributed to extraneous or confounding variables; follow-up tests allow the longer-term impact of using safety behaviours to be investigated.

Secondly, safety behaviours require very careful assessment and identification (Thwaites & Freeston, 2005). Any behaviour can be considered avoidance/escape and/or as a coping strategy depending on the function that it serves for the individual (ibid.). Previous studies have found that assigning safety behaviours to participants or asking them to choose from a pre-defined list can lead to low adherence: participants have previously used safety

behaviours when they were not supposed to, and used subtle or covert safety behaviours which can confound results (Deacon, Sy, Lickel & Nelson, 2010; McManus, Sacadura & Clark, 2008; Milosevic & Radomsky, 2008; Morgan & Raffle, 1999).

Underlining these issues, under-powered studies have been a problem; of the previously mentioned 21 studies, only one used a priori power calculations (Milosevic & Radomsky, 2013). Of the remaining studies, some predicted significant between-group differences (e.g. Powers, Smit & Telch, 2004; Sloan & Telch, 2002), and others predicted non-significant between group differences (e.g. Rachman et al., 1986; Deacon et al., 2010); given the tendency to use numerous dependent variables with mixed support for hypotheses within the studies, there was an increased risk of type I and type II errors, which makes identifying the role of safety behaviours even more complicated. Again, while a priori power calculations are a routine recommendation, this was largely absent from previous studies and was considered particularly important for future research.

A greater emphasis on theoretical underpinnings was also identified as important for future research, not only because it received less attention in previous studies but because it is suggested to further establish whether using safety behaviours are helpful or not to recovery. The neglect of theory-based research and intervention has received increased attention in the literature and several authors have argued that it could be precluding greater advancements in research (Abramowitz, 2013; Herbert, Gaudiano & Forman, 2013; Reese, Rosenfield & Wilhelm, 2013). One area where theory and methodological acumen overlap is in the choice of dependent variable(s).

A study that aims to investigate the impact of safety behaviours, needs dependent variable(s) that measure the underlying construct, and this is based on theory. For example, if a study was based on EPT, outcomes that measure anxiety levels throughout exposure would be important (because EPT emphasises within- and between-session habituation as vehicles

for extinction, Rachman, 1980). Conversely, if the study was based on the ILM, anxiety would most appropriately be measured pre-exposure therapy and at follow-up (because the ILM proposes that within- and between-session anxiety tolerance is helpful and that lowered anxiety is the outcome, rather than the process, of therapy, Craske et al., 2008). However, previous studies have been more exploratory in the measures that they choose (general anxiety measures, specific anxiety measures, belief-based measures etc.) and more exploratory when they are administered. This study planned to be more selective in the dependent variables chosen, and when they are administered, with a greater emphasis on theoretical justification.

The hypotheses were investigated using participants who self-identified as spider phobics. Spider phobia is one of the most common fears in Western society (Davey, 1994a; Thorpe & Salkovskis, 1997) with UK surveys reporting that between 32-55% of women and 18% of men self-report a fear of spiders (Davey, 1992; 1994b). Previous studies have recruited people from non-clinical populations with a fear of animals, particularly spiders because it is so common, and because it is a relatively discrete stimulus (for example, Koch, Spates & Himle, 2004; Muris & Merckelach, 1996; Ost, 1996; Syzmanski & O'Donohue, 1995; Watts & Sharrock, 1984).

1.3 Aim

This study aimed to investigate the impact of safety behaviours during in vivo exposure with a sub-clinical adult sample. Impact was specifically focussed on ability to be in the presence of a live spider as measured by practical behavioural tasks and responses to statements about spiders as measured by questionnaires. Aside from methodological improvements, there was a particular focus on the longer-lasting impact of safety behaviours because this is a less-researched area. Another aim is to take greater account of the

underlying theories that explain the impact of using safety behaviours during in vivo exposure.

The main behavioural approach task required participants to allow a spider out of an enclosed jar and then recapture it and take it to another place in the room. This is suggested as a relevant dependent variable because it essentially measures participant ability to be in the presence of a spider and cope effectively. It replicates a real-life situation where one might be required to cover a spider with a glass, slide a piece of paper underneath the glass and put the spider outside. Administering this ecologically valid measure at pre, post and follow-up allows for the investigation of change over time. A second behavioural approach test, only administered at follow-up, aimed to measure the strength of any positive change by asking participants to hold a spider. This is based on the ILM and cognitive theory ideas that safety behaviours prevent negative beliefs from being weakened and coping beliefs from being strengthened.

1.4 Hypotheses

The basic paradigm is given here to aid understanding of the hypotheses. Pre-exposure data were collected at recruitment and visit one. During visit two, one group of participants were invited to a 1:1 in vivo exposure session using safety behaviours, while another group were invited to do the same session without the use of safety behaviours. Both groups of participants completed the outcome measures again to assess for change. They were then invited to a third, follow-up, appointment to complete outcomes measures for a third time to assess for retention and robustness of gains. The control group attended pre-exposure and follow-up appointments.

1. It was expected that participants who **use** safety behaviours will show some improvement post exposure (significant within-group differences pre/post), but that these gains will not be retained at follow up (non-significant within-group differences

post/follow-up); those who do **not** use safety behaviours were expected to show significant within-group differences pre/post, and post/follow-up.

2. Given that safety behaviours are suggested to help in the short-term, non-significant differences between the two active groups were expected post-exposure on all dependent variables.
3. Participants who received exposure with and without the use of safety behaviours (i.e. the two 'active' groups) were expected to perform significantly better than the control group on all dependent variables at follow-up.

However:

4. At follow up, it was hypothesised that participants who did **not** use safety behaviours would perform significantly better than participants who **did** use safety behaviours on the first behavioural approach test (to demonstrate differences in maintenance/retention of the new learning for those that use safety behaviours during exposure versus those that do not).

Similarly:

5. At follow up, it was hypothesised that participants who do **not** use safety behaviours would perform significantly better than those who **did** use safety behaviours on the second behavioural approach test (to demonstrate the differences in generalisability and robustness of new learning).

2. Method

2.1 Design

An experimental design was used; participants were randomly allocated to the first independent variable, group, of which there were three levels: exposure **without** the use of safety behaviours (exposure), exposure **with** the use of safety behaviours (safety), and a non-exposure control group. The second independent variable was time: pre-exposure, post-

exposure and one week follow-up. This design was congruent with past research and allowed this study to build upon and make comparisons to previous studies.

2.2 Participants

Participants consisted of both undergraduate students and a community sample of working professionals. All participants lived in the South East of England and had at least A Level qualifications.

2.3 Recruitment

Student recruitment was via 17 lecture announcements at two universities based in the South East of England and community recruitment was via advertisements on social networking sites (private messages sent to n = 21). As shown in Figure 3, the author made contact with 1,809 potential participants, of which n = 108 consented to taking part.

2.4 Screening

The recruitment pack included two screening questionnaires (see 'Measures'). At this first stage of screening, n = 34 were ineligible due to low questionnaire scores (Figure 3). During the first appointment, participants were interviewed (see 'Measures') and asked to undertake a behavioural approach test (BAT1). At this second stage of screening, n = 9 were ineligible due to high BAT1 scores (>4).

2.5 Sample

A priori power calculations indicated that a minimum sample size of n = 30 was needed to conduct inferential analyses (see Appendix B). As shown in Figure 3, 33 participants (female n = 28) aged 18 to 30 years (20.7years ± 3.1years) completed the study. Participant demographic information is given in Table 2. No participants were current service users of mental health services and none were on medication (apart from contraception).

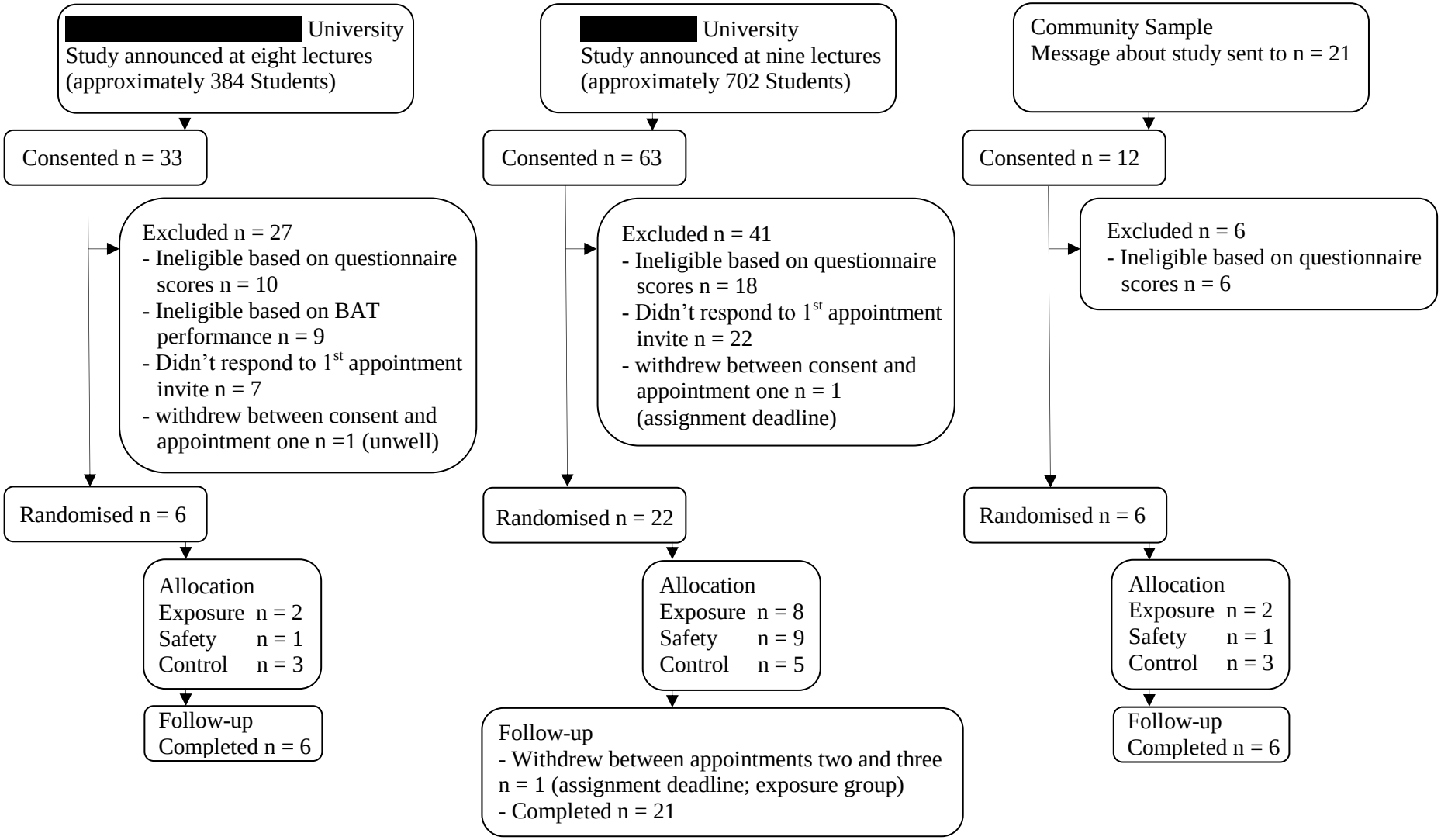

Figure 3. Participant flowchart as per CONSORT guidelines (Schulz, Altman & Moher, 2010) guidelines. Process to show how contact was made with 1,809 participants, and how the final sample (n = 33) was selected.

Table 2.

Demographic information about participants (n = 33) who completed the study.

	Group		
	Exposure	Safety	Control
Age (years)	M = 20.7±3.1	M = 20.5±3.1	M = 20.9±3.1
Gender			
Male	N = 2	N = 1	N = 1
Female	N = 9	N = 10	N = 10
Ethnicity			
Black British		N = 1	N = 1
Bangladeshi British			N = 1
White British	N = 5	N = 5	N = 5
White European	N = 4		
Black Caribbean	N = 1		
Algerian	N = 1	N = 1	
Asian		N = 1	N = 1
Mixed Heritage		N = 2	N = 1
Somali			N = 1
Missing data		N = 1	N = 1

2.6 Materials

2.6.1 Spiders. Consultation with members of the British Arachnological Society was sought to identify spider species that would be representative of the spiders that participants are likely to have experienced (ecological validity), while also representative of the type of spider that they fear (internal validity), as well as being objectively safe to use (see Appendix C). The common house spider, lace web spider, and mouse spider were agreed to meet these criteria. A total of 10 spiders were available (5mm-12mm in size), with selection in the exposure session and BATs being dependent on the type of spider that participants described fearing (in terms of size, colour, body shape etc.) and the type of spider used as a safety behaviour (i.e. a smaller spider).

2.6.2 Equipment for behavioural approach tests. Two plastic tubs (diameter: 120mm), a twig (156mm length), and A4 piece of cardboard were provided for participants to complete these tasks.

2.6.3 Equipment for safety behaviours. These were requested by participants and included a pair of yellow washing-up gloves, a pair of black gardening gloves, a bigger stick (441mm x 12mm x 7mm), and bigger tub (rectangular; 300mm x 200mm x 120mm). Other safety behaviours did not require use of additional equipment.

2.6.4 Software. The website www.randomizer.org was used to conduct block randomisation (to ensure equal group numbers). G*Power (Faul, Erdfelder, Lang & Buchner, 2007) was used to conduct a priori power calculations and statistical analyses were performed using IBM SPSS statistics programme version 21.

2.7 Measures

2.7.1 Structured clinical interview for axis 1 disorders, research version (SCID-I-RV; First, Spitzer, Gibbon & Williams, 2002) [screening tool]. This tool is specifically designed for research use and has high discriminant validity and inter-rater reliability (Carlbring et al., 2002). The specific phobia section was used to determine whether participants met non-clinical, sub-clinical or clinical levels of spider phobia according to the Diagnostic and Statistical Manual of Mental Disorders (4th Ed.; DSM-IV, American Psychiatric Association, 1994).

2.7.2 Behavioural approach tests (BATs). While questionnaires are routinely used in research studies, previous research on anxiety has also involved practical-based dependent variables. These are often behavioural tasks that aim to capture potential change/difference from a more applied perspective, which is suggested to improve the ecological validity of the study. A common method used by previous studies involving in vivo exposure is to devise 'behavioural approach (or avoidance) tests' (BATs; for example, Baker et al., 2010; Hood et al., 2010; Koch et al., 2004; Milosevic & Radomsky, 2008; Olatunji, Etzel, Tomarken, Ciesielski & Deacon, 2011; Ost, 1996; Powers, Smits & Telch, 2004; Sloan & Telch, 2002; Sy et al., 2011). The BATs were the measures of most interests because of their construct

validity and ecological validity. Higher scores indicated greater progress in terms of spider phobia.

2.7.2.1 Behavioural approach test 1 (BAT1) [pre, post and follow up measure]. Participants walked into a room with a spider in a closed, but transparent, plastic jar on a table. They were asked to approach the jar, undo it, coax the spider to come out of the jar (by laying the jar on its side and using the twig provided), recapturing the spider using a piece of card and another plastic jar, and then transporting the spider to another table in the room. Participants were not required to make direct contact with the spider. This task was broken down into several operational stages so that participants received a score from 0-13.

2.7.2.2 Behavioural approach test 2 (BAT2) [follow up]. In this task, participants were similarly asked to coax a spider out of the jar, but this time use their bare hands to pick it up and keep it in their hands for as long as possible, before placing the spider into a second jar. Participants received a score from 0-12; for BAT participant instructions, see Appendix D.

2.7.3 Questionnaire data. Identification of appropriate questionnaires was challenging because of the lack of relevant, psychometrically strong questionnaires specific to spider phobia. Relevant questionnaires were prioritised over psychometric quality as it was deemed more important to have measures related to the subject that would be interpreted with caution, than to have strong conclusions about general anxiety (particularly given that the questionnaires were secondary to the BATs).

2.7.3.1 Spider phobia questionnaire (SPQ; Watts & Sharrock, 1984) [screening tool; pre, post, follow up measure]. This is a self-report 33-item questionnaire that asks for ‘yes’ / ‘no’ responses to statements about spiders (scored 0-33). The authors demonstrated good internal consistency, convergent validity, and divergent validity. Participants completed this measure at screening, and if randomised into the study, this acted as their pre-exposure score. However, the test-retest reliability has received mixed results, the ‘true/false’ response format

can be restrictive, and there has been a lack of variance in scores for control groups (Muris & Merckelbach, 1996). The fear of spiders questionnaire (Syzmanski & O'Donohue, 1995) was designed to address some of these weaknesses and to be used alongside the SPQ.

2.7.3.2 Fear of spiders questio*nnaire (FSQ, Szymanski & O'Donohue, 1995)* [screening tool; pre, post, follow up]. This is a self-report18-item questionnaire that asks participants to respond to statements about spiders on a seven-point Likert scale (scored 0-126). Participants completed this measure at screening, and if randomised into the study, this acted as their pre-exposure score. This questionnaire was designed to complement the information gained from the SPQ. The development of this questionnaire was able to attain good test-retest data, to discriminate between phobics and non-phobics, with good spilt half reliability, internal consistency, convergent validity and construct validity.

2.8 Procedure

Figure 4 is a schematic of the study designed to aid understanding of the study design and procedure. Following recruitment (see Section 2.3), participants attended visit one for a second stage of screening and to complete pre-exposure data collection. The SCID-I-RV (First et al., 2002) was administered, and participants were invited to undertake BAT1. This was used to generate the individual negative automatic thoughts (Beck, 2011) driving each participant's fear. These negative automatic thoughts were used to tailor appointment two. Between appointment one and appointment two, participants were block randomised into one of the three groups. There were between 7 and 14 days between each appointment for all participants.

2.8.1 Appointment two. For appointment two, the two active groups (exposure and safety) were invited to a 60 minute appointment, which consisted of therapist-assisted in vivo exposure to a live spider, and post-exposure data collection (those in the safety group used

their safety behaviours to complete BAT1 too). As shown in Figure 4, appointment two was not attended by participants in the control group.

The in-vivo exposure content was informed by one-session treatment studies of spider phobia (Ost, 1989; Ost, 1996; Zlomke & Davis, 2008). They were not implemented in full because this was not a treatment study. The participant and researcher started the session by sitting at two tables fitted together and talking through a cognitive-behavioural rationale for exposure therapy (Beck, 2011; Appendix E). They were then encouraged to observe the spider, approach the tub that the spider was kept in and take steps such as holding the tub close to them or allowing the spider to walk on the table. Although the session was manualised, this was altered if it did not address participants' concerns. For example, some reported not feeling anxious when the spider was still, thus the exposure involved using a twig to gently initiate movement from the spider. This formulation-driven approach to exposure is argued to increase the construct and ecological validity of the study, without introducing confounding variables.

Those in the safety condition were permitted to use any safety behaviours they reasonably could. These were identified in visit one so that the researcher could bring any necessary equipment (see Section 2.6.3). However, any additional safety behaviours were also checked for throughout the session in both groups given the high rate of covert safety behaviours identified in previous studies (Deacon et al., 2010; Hood et al., 2010; McManus et al., 2008: Milosevic & Radomsky, 2008; Morgan & Raffle, 1999). A list of the SBs used by participants is given in Table 3.

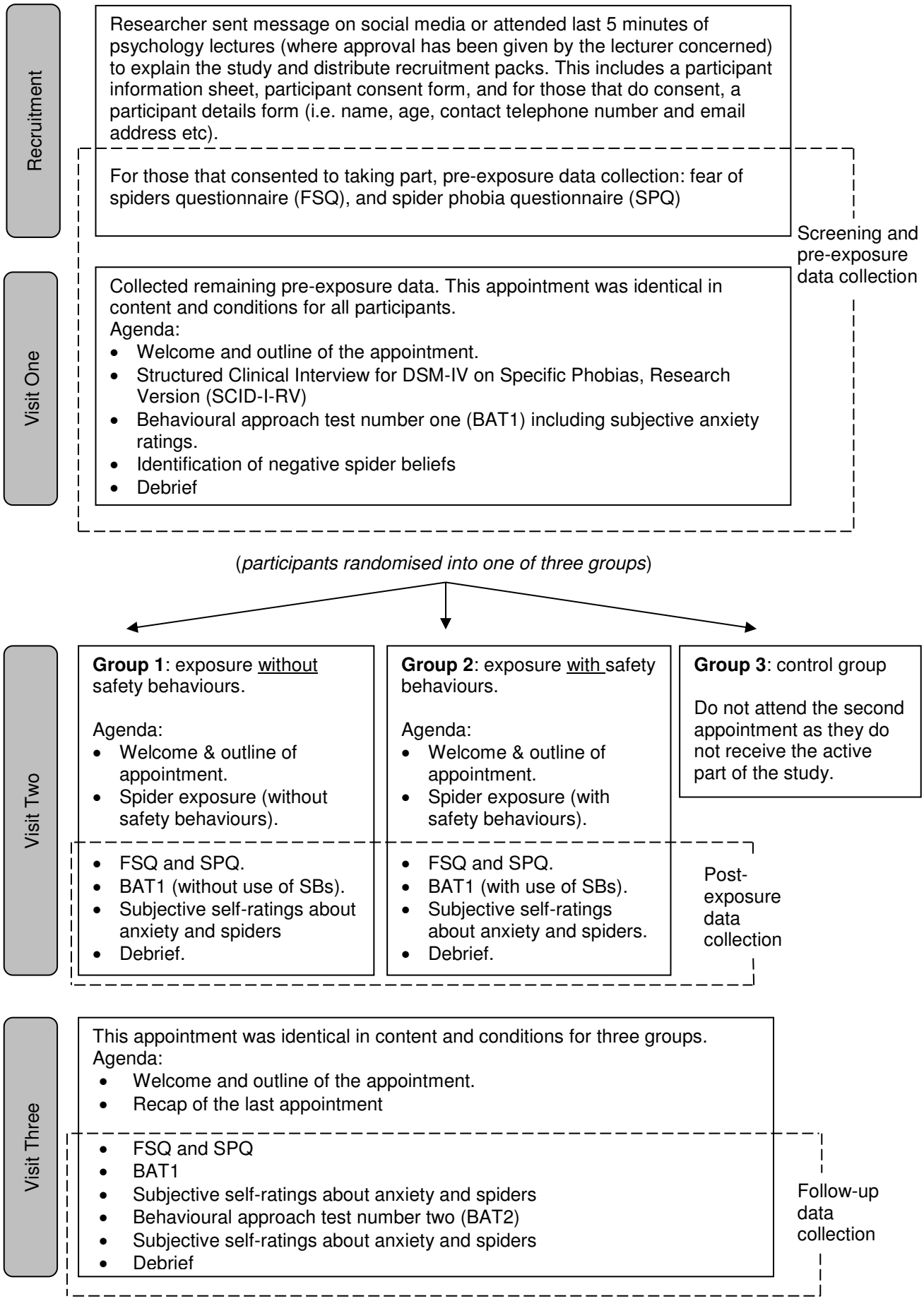

Figure 4. Study schematic. This summarises the study design, recruitment, and procedure.

Table 3.

Safety behaviours used by participants (n = 11) during the in vivo exposure session.

Participant ID	**Safety behaviours**
RYRS17	Smaller spider, gloves, researcher presence and support, bigger stick.
MNMO40	Smaller spider, gloves, researcher presence, bigger stick, lid loosened so that tub opens using stick rather than hands, distance from table, bigger tub.
RABR43	Smaller spider, participant's own gloves, researcher presence, bigger stick, distance from table.
MNBT46	Smaller spider, gloves, researcher presence, bigger table, turning tub so that spider is at a distance.
EYGN47	Smaller spider, gloves, researcher presence, arms out-stretched to prevent proximity to spider
MASY66	Smaller spider, gloves, researcher presence, using one hand.
BIXJ76	Smaller spider, gloves, researcher presence, moved chair, moved legs ready to escape.
LGCE79	Smaller spider, two pairs of gloves, researcher presence, bigger stick, separated tables (spider on one, participant at the other), moved closer to door.
SAMN83	Smaller spider, researcher presence, move chair, stick not used by any other participants so that this participant could be sure that the stick had not already touched the spider, took lid off quietly to avoid 'waking the spider up' and causing it to move.
EYMR87	Smaller spider, gloves, bigger stick, researcher presence, use of table mats to create an 'arena' (more controllable area), not taking eyes off the spider.
LNNS100	Smaller spider, gloves, bigger stick, researcher presence, separated tables (spider on one, participant at the other).

Post-exposure data collection was then conducted. The questionnaires were administered before the BATs because the BATs involved exposure to spiders too so this prevented the BAT performance from influencing questionnaire responses.

2.8.2 Appointment three. Approximately one week after appointment two, participants were invited to a follow-up session. As shown in Figure 4, this involved re-capping previous visits and asking participants to complete the three dependent variables that they were familiar with. The second BAT (BAT2) was then offered to participants.

2.9 Ethical Considerations

All participants gave written consent (Appendix F) after reading the Participant Information Sheet (Appendix G). Following consultation with the Salomons Advisory Group of Experts (SAGE), and in keeping with guidelines from Canterbury Christ Church University (CCCU, 2006a,b; 2008) and the British Psychological Society (BPS, 2010), several safeguards were in place to protect and empower participants when undertaking this study (Appendix C). The British Arachnological Society were consulted for advice on the appropriate care of the spiders. University ethical approval was granted (Appendix H).

2.10 Data Analysis

Descriptive statistics (M±SD) were applied to the four dependent variables and the data was checked for any violation of parametric assumptions. The BAT data were not normally distributed so a log transformation was applied (Field, 2013). As these data contained zero values, a constant (1) was added to all values (Xi + 1) and this allowed ANOVAs to be conducted to explore main effects. For within- and between-group effects, the BAT data was corrected using 1000 bootstrapped samples (Field, 2013). The remaining data met parametric assumptions.

Repeated measures ANOVAs were planned for time and group interactions; one-way ANOVAs were planned for within-group effects, and independent ANOVAs were planned for between-group main effects. Where significant results were found, paired sample t tests were used to explore within-group differences and independent t tests were used to explore between-group effects. In order to account for multiple comparisons (and thus an increased

risk of Type I error), a Bonferroni adjustment was applied to the results pertaining to the hypothesis. P values were considered according to the usual α- level of .05 and the Bonferonni adjustment α-level of .02. As recommended by Clark-Carter (1997), probability of results that did not reach the adjusted α-level were not treated as non-significant, but instead were treated with more caution.

3. Results

3.1 Manipulation Checks

3.1.1 Clinical presentation. All participants met diagnostic criteria of specific phobia with the exception of criterion E: clinically significant distress or impairment in social, occupational, or other important areas of functioning (as measured by the SCID-I-RV, First et al., 2002). This objectively placed all participants at an equal (sub-clinical) level of fear of spiders.

3.1.2 Appointment gaps. A one-way independent ANOVA demonstrated no main effect of group on the time between appointment one and appointment two $F(2, 30) = .6$, $p = .56$ and an independent t tests demonstrated a non-significant difference between the exposure and safety groups for their second and third appointments $t(20) = .10$, $p = .09$. This meant that the average time between appointments was unlikely to account for any differences between groups.

3.1.3 Safety behaviour adherence. All participants were asked about safety behaviour use at the beginning and end of every appointment. All participants in the safety group (n = 11) used safety behaviours during the exposure session and during all BATs. Within the exposure group, one participant used the twig to create distance from the spider during BAT1 at first, but then spontaneously stopped this safety behaviour; another participant made sure that the spider was not near their hands. Safety behaviour use was not reported by any

exposure participants during BAT1 at follow-up; after BAT2, one participant described being close to the spider but being prepared to get away if need be.

3.1.4 BAT2. BAT2 was considered to differentiate between participants that had successfully achieved extinction, and those that had not. In order to check this, participants were asked how BAT1 and BAT2 compared, and whether BAT2 was harder, easier, or the same as BAT1. All participants reported BAT2 as more difficult.

3.2 Baseline Checks

A one-way ANOVA with log transformation was conducted to explore between-group differences on mean BAT1 scores pre-exposure. There was no evidence of a difference between-groups on mean BAT1 scores $F(2, 30) = .31$, $p = .74$.

One-way ANOVAs were conducted on the questionnaire data to explore between-group differences pre-exposure. There was no evidence of a difference between-groups on mean FSQ scores $F(2, 30) = .38$, $p = .69$ or mean SPQ scores $F(2, 30) = 1.27$, $p = .30$.

To summarise, there were non-significant differences between groups on the three dependent variables at the pre-exposure time point, meaning that all three groups were similar to each other at baseline (the fourth dependent variable, BAT2, was only administered at the follow-up appointments).

3.3 Preliminary Results

Deacon et al. (2010) demonstrated that presenting results according to hypotheses improved clarity of the analyses. Thus the first section of results provides analyses that might provide a helpful context to the reader. The second section provides analyses according to the hypotheses from Section 1.4. Descriptive statistics for the four dependent variables are given in Table 4. Please see Appendix I for correlation analyses.

Table 4.

Means and standard deviations for dependent variables by group.

	Group								
	Exposure			Safety			Control		
Measures	Pre N = 11	Post N = 11	FU N = 11	Pre N = 11	Post N = 11	FU N = 11	Pre N = 11	Post N = 11	FU N = 11
FSQ (0-126)									
M	99.3	76.7	71.1	103.2	79.5	81.3	99.6	n/a	93.0
SD	10.1	17.4	16.4	12.4	18.2	15.4	12.3	n/a	11.0
SPQ (0-33)									
M	21.4	19.2	16.4	17.5	17.2	16.1	19.1	n/a	19.2
SD	5.7	5.1	5.6	6.3	3.6	4.3	5.2	n/a	3.0
BAT1 (0-13)									
M	1.5	11.7	13	1.1	7.5	3.1	1.1	n/a	1.6
SD	1.7	2.2	0	1.6	4.8	4.0	1.3	n/a	1.3
BAT2 (0-12)									
M	n/a	n/a	9.3	n/a	n/a	0.5	n/a	n/a	0.4
SD	n/a	n/a	4.9	n/a	n/a	1.0	n/a	n/a	1.0

3.3.1 BAT data. Main effects. A mixed two-way ANOVA with log transformation was conducted to explore whether there was a main effect on the BAT1 data. Time was entered as a within-subjects factor and group was entered as a between-subjects factor. There was a significant main effect of time on BAT1 scores $F(2, 30) = 22.45$, $p < .001$ and significant interaction between time and group on BAT1 scores $F(2, 30) = 80.71$, $p < .001$.

A one-way independent ANOVA with log transformation was conducted to explore a main effect on BAT2 data. There was a significant main effect of group on BAT2 scores $F(2, 30) = 24.51$, $p < .001$.

3.3.1.2 Within-groups: BAT1. Paired samples t tests with bootstrapping were conducted to explore within-group differences on the BAT1 data. On average, exposure group participants increased the number of steps they could complete on BAT1 pre (M = 1.5±1.7) to follow-up (M = 13±0) by -11.45, BCa 95% CI [-12.36, -10.36], which was significant $t(10) = -22.41$, $p < .001$. Similarly, the safety group increased the average number

of steps they could complete on BAT1 pre (M = 1.1±1.6) to follow-up (M = 3.1±4.0) by -2.0, BCa 95% CI [-3.74, -.64], which was significant t(10) = -2.35, p <.05. However, the slight average increase in the control group from pre (M = 1.1±1.3) to follow-up (M = 1.6±1.3) by -.55 BCa 95% CI [-1.54, .63] was non-significant t(10) = -.97, p = .36.

3.3.2 Questionnaire Data. Main effects. A mixed two-way ANOVA was conducted to explore whether there was a main effect on the FSQ data. Time was entered as a within-subjects factor and group was entered as a between-subjects factor. There was a significant main effect of time on FSQ scores $F(1, 30) = 70.94$, $p < .001$ and significant interaction between time and group on FSQ scores $F(2, 30) = 8.13$, $p < .01$. The same analysis on the SPQ data showed a significant main effect of time on SPQ scores $F(1, 30) = 10.73$, $p < .01$ and significant interaction between time and group on SPQ scores $F(2, 30) = 5.62$, $p < .01$.

3.3.2.2 Within-group effects: FSQ. Paired sample t tests were conducted to explore within-group differences on the questionnaire data. The mean FSQ scores significantly decreased from pre-exposure (M = 99.3±10.1) to follow-up (M = 71.1±16.4) within the exposure group t(10) = 7.07, p < .001 and decreased significantly from pre-exposure (M = 103.2±12.4) to follow-up (M = 81.3±15.4) within the safety group t(10) = 5.03, p < .01. The FSQ scores decreased from pre-exposure (M = 99.6±12.3) to follow-up (M = 93.0±11) in the control group, but this was non-significant t(10) = 2.05, p = .07.

3.3.2.3 Within-group effects: SPQ. The mean SPQ scores significantly decreased from pre-exposure (M = 21.4±5.7) to follow-up (M = 16.4±5.6) within the exposure group t(10) = 4.23, p < .01. There was a non-significant decrease in SPQ scores from pre-exposure (M = 17.5±6.3) to follow-up (M = 16.1±4.3) within the safety group t(10) = 1.33, p = .22 and a slight non-significant increase in SPQ scores from pre-exposure (19.1±5.2) to follow-up (M = 19.2±3.0) within the control group t(10) = .08, p = .07.

3.3.2.4 Between-group effects: follow-up. Independent one-way ANOVAs were conducted to explore between-group differences at follow-up on the questionnaire data. There was a significant effect of group at follow-up on mean FSQ scores $F(2, 30) = 6.33$, $p < .01$ indicating that FSQ scores differed according to which group the participant was in (further explored as part of the hypothesis-based results below). There was a non-significant effect of group at follow-up on mean SPQ scores $F(2, 30) = 1.65$, $p = .21$.

3.4 Hypotheses-Based Results

#1 The exposure group will have significant pre/post and post/follow-up differences on all dependent variables, whereas the safety group will have significant pre-post differences but non-significant post/follow-up differences on all dependent variables.

BAT1. As predicted, there were significant pre-post within-group differences for both active groups on BAT1. The exposure group completed more mean steps pre (M = 1.5±1.7) to post (M = 11.7±2.2) by an average of -10.18, BCa 95% CI [-11.45, -8.91], $t(10) = -14.86$, $p < .001$ (with and without the Bonferroni adjustment), as did the safety group (pre: M = 1.1±1.6, post: M = 7.5±4.8), by an average of -6.36, BCa 95% CI [-8.64, -4.09], $t(10) = -4.97$, $p < .01$ (with and without the Bonferroni adjustment). Although significant post to follow-up within-group differences were predicted for the exposure group, the increase in BAT1 completion (follow-up: M = 13±0) was non-significant -1.27, BCa 95% CI [-2.64, -.36], $t(10) = -1.92$, $p = .08$. Similarly, non-significant post to follow-up within-group differences were predicted for the safety group, but conversely, the average number of steps they completed significantly decreased from post (M = 7.5±4.8) to follow-up (M = 3.1±4.0) by 4.36, BCa 95% CI [2.18, 7.0], $t(10) = 3.48$, $p < .05$ (but not with the Bonferroni adjustment) indicating that the safety group did not maintain (or improve) gains, but instead regressed.

FSQ. As predicted, there was a significant decrease in mean FSQ scores pre- (M = 99.3±10.1) to post-exposure (M = 76.7±17.4) $t(10) = 4.82$, $p < .01$ and post-exposure to follow-up (M = 71.1±16.4) $t(10) = 2.99$, $p < .05$ within the exposure group (but not with the Bonferroni adjustment). Also as predicted, there was a significant decrease in mean FSQ scores pre- (M = 103.2±12.4) to post-exposure (M = 79.5±18.2) within the safety group $t(10) = 4.64$, $p < .01$ (with and without Bonferroni adjustment) but contrary to hypothesis one, there was a slight non-significant increase (not decrease) in FSQ scores post to follow-up (M = 81.3±15.4) within the safety group $t(10) = -.33$, $p = .75$.

SPQ. As per hypothesis one, there was a significant decrease in mean SPQ scores pre- (M = 21.4±5.7) to post-exposure (M = 19.2±5.1) $t(10) = 2.47$, $p < .05$ and post-exposure to follow-up (M = 16.4±5.6) $t(10) = 2.58$, $p < .05$ within the exposure group (but not with the Bonferroni adjustment). Contrary to hypothesis one, the decrease in mean SPQ scores pre- (M = 17.5±6.3) to post-exposure (M = 17.2±3.6) within the safety group was non-significant $t(10) = .21$, $p = .84$, but as predicted, the decrease in mean SPQ scores from post to follow-up (M = 16.1±4.3) was non-significant within the safety group $t(10) = 2.06$, $p = .07$.

#2. Post exposure: non-significant differences between the exposure and safety groups on all dependent variables.

BAT1. An independent t test with bootstrapping was conducted to explore between-group differences on BAT1 data post-exposure. Contrary to hypothesis two, there was a significant difference between the exposure (M = 11.7±2.2) and safety (M = 7.5±4.8) groups, such that the exposure group completed more steps by an average of 4.27, BCa 95% CI [1.29, 7.36], $t(20) = 2.67$, $p < .05$.

Questionnaire data. One way ANOVAs were conducted to explore between-group differences post-exposure on the questionnaire data. As predicted, there was a non-significant

effect of group post exposure on FSQ scores $F(1, 20) = .14$, $p = .72$ and SPQ scores $F(1, 20) = 1.14$, $p = .30$.

#3. Follow-up: the exposure group and safety group will perform significantly better than the control group on all dependent variables.

BAT1. Independent t tests with bootstrapping were conducted to explore between-group differences on BAT1 data at follow-up. The exposure group (M = 13±0) performed better than the control group (M = 1.6±1.3) by an average of 11.36, BCa 95% CI [10.62, 12.09], and this was significant $t(20) = 29.3$, $p < .01$ (with and without the Bonferroni adjustment). However, the difference in mean BAT1 scores at follow-up between the safety (M = 3.1±4.0) and control group were non-significant 1.45, BCa 95% CI [-.76, 4.05], $t(20) = 1.14$, $p = .27$.

BAT2. Independent t tests with bootstrapping were conducted to explore between-group differences on BAT2 data. As predicted, the exposure group (M = 9.3±4.9) performed better than the control group (M = 0.4±1.0) by an average of 8.91, BCa 95% CI [5.73, 11.73] and this was significant $t(20) = 5.9$, $p < .001$ (with and without the Bonferroni adjustment). This also represented a large effect size $d = 2.52$ (Field, 2013). Contrary to prediction, the difference in mean BAT2 scores between the safety (M = 0.5±1.0) and control group was non-significant .09, BCa 95% CI [-.74, .98], $t(20) = .23$, $p = .84$.

Questionnaire data. Independent samples t tests showed that the exposure group (M = 71.1±16.4) had significantly lower scores compared to the control (M = 93.0±11.0) $t(20) = -3.68$, $p < .01$ in mean FSQ scores at follow-up (with and without the Bonferroni adjustment), and this represented a large effect size $d = 1.57$. Contrary to hypothesis three, the safety group (M = 81.3±15.4) had a non-significant difference in mean FSQ scores compared to the control $t(20) = -2.04$, $p = .06$. Contrary to hypothesis three, there was a non-significant effect of group at follow-up SPQ scores $F(2, 30) = 1.65$, $p = .21$

#4 Follow-up: the exposure group will perform significantly better than the safety group on BAT1

As predicted, the exposure group (M = 13±0) performed better than the safety group (M = 3.1±4.0) on BAT1 at follow-up by an average of 9.91, BCa 95% CI [7.19, 12.0], $t(20) = 8.14$, $p < .001$ (with and without the Bonferroni adjustment). This represented a large effect size, $d = 3.5$

#5 Follow up: the exposure group will perform significantly better than the safety group on BAT2

As predicted, the exposure group (M = 9.3±4.9) completed more BAT2 steps than the safety group (M = 0.5±1.0) and this was a significant difference, 8.82, BCa 95% CI [5.6, 11.3], $t(20) = 5.82$, $p < .001$ (with and without the Bonferroni adjustment). This also represented a large effect size, $d = 2.49$.

4. Discussion

This study set out to investigate the impact that safety behaviours have during in vivo exposure for anxiety by building upon the findings of previous empirical studies and review papers. Within-group data and post-exposure data were used to investigate claims about the short-term gains that safety behaviours are purported to provide. Between-group follow-up data were used to investigate predictions that safety behaviours are unhelpful in retaining and generalising gains.

4.1 Short-Term Gains

Support for the safety group hypotheses were mixed. While the mean number of steps completed in BAT1 significantly increased overall, the number of mean completed steps significantly decreased post to follow-up (rather than being non-significant as predicted by hypothesis five). This deterioration was also shown in mean FSQ scores: while scores significantly decreased overall (pre to follow-up), and pre- to post-exposure, scores then

increased again between post to follow-up (although this was non-significant, an increase in scores was not expected on any measure).

Hypothesis one predicted that there would be non-significant differences between the exposure and safety groups post-exposure. This was the case for questionnaire data, but not BAT1 (the exposure group performed significantly better). Hypothesis two predicted that the safety group would perform better than the control group on all measures at follow up. However, this was not the case for any of the measures.

Overall, there was weak evidence of the advantage of using SBs for short-term progress. This was demonstrated when the exposure group performed significantly better than the safety group and more so when the safety group mean scores were non-significantly different to the control group. This could be due to the improved methodology of this study, particularly the higher adherence to study procedure (i.e. those in the safety group used safety behaviours, those in the exposure group did not use safety behaviours – this has been difficult for previous studies to achieve). Thus a beneficial role for safety behaviours during in vivo exposure as underpinned by EPT did not receive support in this study.

4.2 Retaining and Generalising Gains

The results for the exposure group were, largely, as hypothesised. Those that did not use safety behaviours performed significantly better than the control (hypothesis two). On BAT1, the exposure group made significant progress from pre- to follow-up, such that by follow up, all participants could complete BAT1. This may explain why their pre- to post-exposure scores increased significantly, but the increase from post to follow-up was non-significant (hypothesis five). As predicted, the exposure group showed significant pre-exposure to follow-up, pre- to post-exposure, and post-exposure to follow-up within group decreases on the two questionnaires (hypothesis five).

As predicted, the exposure group performed significantly better than the safety group on BAT1 and BAT2 at follow up (hypotheses three and four). This provides support for cognitive theory and ILM – namely that the strength of cognitive change is maximised when safety behaviours are dropped, and this in turn allows for robust progress (such as being able to independently move a spider (BAT1) and even holding a spider (BAT2). The lack of retention in the safety group was demonstrated in the way that the mean number of BAT1 steps completed decreased at follow-up. The poor generalisation in the safety group was demonstrated in the high refusal rate to undertake BAT2 (9 out of 11 participants), which led to a mean score that did not differ from the control group, but was significantly lower than the exposure group. Previous studies have shown that those using safety behaviours might show initial progress but then start to show signs of deterioration (e.g. Hood et al., 2010; van den Hout et al., 2011).

4.3 Practice Implications

Safety behaviours have been suggested as a potential way of addressing the high refusal and drop-out rates in exposure therapy (Rachman et al., 2008; 2011). Given the extent of this problem, it is tempting to use safety behaviours as a solution (they bring relief to participants, which seems intuitively useful). However, there are two points to make about this. Firstly, in clinical practice, it would be rare to expect immediate and total elimination of all safety behaviours. Clinicians are witness to routine use of safety behaviours in therapy, which are usually allowed in the interest of therapeutic rapport and pacing therapy as appropriate to the individual. Secondly, to explicitly initiate and facilitate safety behaviours is something quite different, which is perhaps explicated by use of an analogy. Imagine an overweight person joining a weight loss programme: the facilitators are likely to be aware of people occasionally binging on chocolate cake – people can have an ‘off’ day and/or find it difficult to give up unhealthy eating habits ‘cold turkey’. However, to use chocolate cake as an incentive to join

the club is in contrast to what is known about healthy living and weight loss. Similarly, we might recognise the difficulties that anxious people are faced with in undertaking exposure therapy and notice avoidance or refusal. However, this study has demonstrated that to use safety behaviours as a solution, is in contrast to the theory. Arguably, this could be allowable if it could be demonstrated that safety behaviours can give that early advantage and not cause problems later on. However, previous studies have shown early advantages only last for 5-10 minutes (Milosevic & Radomsky, 2008) and this study has demonstrated that using safety behaviours is not only not equivalent to using safety behaviours, it put participants at a disadvantage. Thus in clinical practice, we might not always challenge the use of safety behaviours, but we need to be aware that if safety behaviours are being used, progress is hindered.

This study has also attempted to contribute towards what a good outcome looks like. While positive changes in questionnaire scores are encouraging and routinely used for evidence-based practice, the use of behavioural approach tests have given a more 'real-world' or applied understanding of how much progress participants made. It is perhaps these more ecologically valid measures that help research contribute towards offering something helpful to the people affected by clinical levels of anxiety.

4.4 Limitations

A main limitation was that although participants were blind to which condition they were in, the author, who acted as therapist, data collector, and data analyst, was not blind. This increased the chance of bias, although this was partially addressed by the use of manualised appointments and objective outcome measures.

Ideally, safety behaviours would have been manipulated in a treatment study and participants with clinical levels of anxiety would have been recruited. However, this was not the case, so further research would be needed (Section 4.5).

Lastly, this study focussed on therapist assisted in vivo exposure, rather than, for example self-help, virtual, or imaginal exposure. Arguably this is important when considering the future of exposure therapy as self-help and computer-based interventions are receiving increasing consideration for primary care (Craske et al., 2009). Thus it might be important to consider the role of safety behaviours within different types of exposure and perhaps for different levels of care (primary, secondary, tertiary).

4.5 Future Research

Replication is an important aspect of future research (Clark-Carter, 1997) and vital for ensuring a clear understanding of the impact that using safety behaviours have during in vivo exposure for adults. It is also suggested that these findings be developed. For example, spider phobia is a useful construct for investigating what is helpful when patients feel anxious, but the next stage would be to ensure that these findings can be clinically applied with clinical groups.

It has also become increasingly important to understand the details of the ILM and cognitive theory. The former focusses on fear structures, while the latter focusses on strength of negative beliefs. These ideas have been congruent enough for the purposes of this study's investigations, but to further the theoretical basis for exposure and elimination of safety behaviours, greater detail about the similarities and differences between these is needed. Following this, more research is needed on how these cognitive processes potentially mediate subsequent lowered anxiety levels.

5. Conclusion

There has been considerable debate regarding the use of safety behaviours in exposure therapy for anxiety. While the stronger narrative has always been to eliminate the use of safety behaviours, there has been growing interest in the possibility that safety behaviours

may not be as harmful to recovery, and further, might help those who find current evidence-based practice inaccessible.

This study aimed to contribute to the debate by demonstrating that more robust methodology and tighter theoretical underpinnings would show that safety behaviours can mimic extinction in the short term, but that this is not retained, and further harms the generalisation and robustness of the learning process. In this sense, there was support for cognitive theory, and the inhibitory learning model.

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Appendix A

Data Extraction Form

OVERVIEW:

Authors:

N:

Participants:

Design:

Exposure paradigm:

Outcome measures:

Results:

METHODOLOGICAL ISSUES

Study:

Sample:

Screening/Eligbility:

Measures:

Use of radomisation: control: follow-up:

Confounds:

Theoretical basis:

SAFETY BEHAVIOURS:

Definition:

By function:

Idiosyncratic:

Covert/additional SBs:

Dropping SBs:

Generalisability:

Appendix B

A Priori Power Calculations

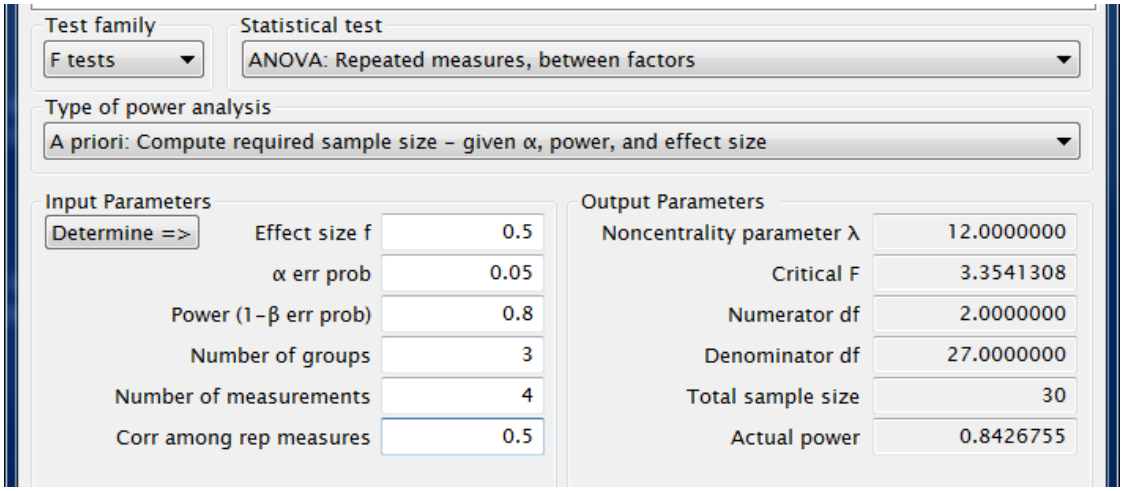

Figure A1. G*Power Screenshot. This shows the information entered into the G*Power program in order to know the minimal sample size needed for the study.

Appendix C

Ethical Considerations

- The BATs were referred to as ‘tasks’ (as opposed to ‘tests’) to avoid potential stigmatised or pressured interpretations from the participants.
- The study was conducted within the framework of basic good practice skills in interacting with others i.e. warmth, positive regard, and facilitation of a good rapport. This was also done to support participants to feel able to self-advocate and opt out or stop if they wish to.
- As with any aspect of the study, but particularly the BATs, participants were always free to opt out or stop at any point, and were not coerced/forced/tricked into undertaking more than what felt comfortable to them. They were explicitly made aware of this on the participant information sheet and in each appointment.
- Participants were given clear guidance about what the BATs would involve (both on the participant information sheet, in the orientation at the beginning of each appointment, and on the instructions sheet). This enabled an informed choice at every stage.
- Participants were debriefed at the end of each session. This meant that they were asked how they were feeling and whether they felt able to continue with their day as planned. They were also offered a relaxation exercise (listening to music while being invited to take slow, deep breaths).
- It was planned that in the unlikely event that participants experienced significant distress while undertaking the BATs, the task would have been stopped and they would have had the opportunity to debrief with the researcher. As part of this, they would have been given verbal and written information about getting further help from other sources of support. (It was considered unlikely because of the frequency with

which BATs have been used in previous studies and the seeming absence of any reported concerns about using BATs as a dependent variable).

- Spiders were provided by a member of the British Arachnological Society to ensure correct species were used.
- Each participant was debriefed after each appointment to ensure that they felt safe enough to leave the appointment.
- An open workshop was offered to anyone approached about the study (including those who did not wish to take part or those that withdrew). This was a practical session based on spider phobia and exposure principles.
- Anyone who consented to take part in the study and/or attended the workshop was offered a free self help guide (Hogan, 2007).
- Participants were asked to have relatively relaxed plans for after each session), so as to avoid potential build-up of stress.
- The British Arachnological Society were consulted with regards to proper care for the spiders.

Appendix D

Participant Instructions for BAT1 and BAT2

TASK A

This task involves transporting a spider from one jar to the other, without actually touching it. The spider is real and is about 10mm (or 1cm) in size. This task is broken down into steps as given below.

It is only natural to feel anxious about this, and is important to only do what you comfortably can. Some people might do none of the task, some people might do some of the task, and some people might do all of the task. In order to help the anxiety, it is suggested that you read all of the steps below first, as this will help you to know what is going to happen.

Once you have read all of the steps below, you can decide if step one seems doable, and take each step one at a time.

Please remember that you are asked to only challenge yourself as much as feels comfortable. You are free to stop at any time and do not have to justify this.

Steps to the task

- Walk towards the table with the jar on it (the jar is closed, and the spider cannot currently get out of the jar).
- Unscrew the jar.
- Take the lid off the jar.
- Place the lid on the table.
- Place the jar on its side, and using the twig provided, try to coax the spider out of the jar.
- Once the spider, is out of the jar, try to recapture it by placing the second jar over it.
- There is a piece of paper on the table. Try to slide this under the jar. Please do so slowly and carefully.
- Next, please transport the spider (using the paper and jar) to the other table.

That is the end of the task. The researcher will replace the lid on the jar now.

TASK B

This task involves transporting a spider from one jar to the other just like the other task, except this time, you are asked to make contact with the spider. The spider is real and is about 10mm (or 1cm) in size. This task is broken down into steps as given below.

As before, it is normal if you feel very anxious and unsure about doing this. Like last time, please read all of the steps in the task below so as to help you fully understand what is being asked.

Once you have read all of the steps below, you can decide if step one seems doable, and take each step one at a time.

Please remember that you are asked to only challenge yourself as much as feels comfortable. You are free to stop at any time and do not have to justify this.

Steps to the task

- Walk towards the table with the jar on it (the jar is closed, and the spider cannot currently get out of the jar).
- Unscrew the lid of the jar.
- Take the lid off the jar.
- Place the lid on the table.
- Place the jar on its side, and using the twig provided, try to coax the spider out of the jar.
- Now try to allow the spider to walk onto your hand.
- Once the spider is on your hand, allow it to walk around your hand(s) for a while.
- Next, guide the spider back into the jar.
- Lastly, screw the lid back on the jar.

That is the end of the task.

Appendix E

Exposure Session: Rationale for Participants

"In everyday life, we all face situations that we make certain interpretations about." Give participant hand out entitled *'pack 3 handout'.*

"For example, if the situation was that you were about to leave your house this morning and there was a snow blizzard, you might think (researcher point to thought bubble on hand out) "wow! I love snow! This is going to be fun!" This would likely lead you to feel (researcher to point to feelings on hand out) happy and excited. As a result, your behaviour (researcher to point to behaviours on hand out) might be to rush out of the house."

"On the other hand, if the exact same situation was interpreted as dangerous or inconvenient, you might have had thoughts like (researcher to point to thought bubble on hand out Figure A2) "I can't believe it's snowing! I'll never get to my appointment now – transport won't be working, and I bet I am going to slip and hurt myself". This would understandably leave you feeling (researcher to point to feelings on hand out – Figure A2) frustrated, or angry, or annoyed etc". Your behaviour might be to slam the door closed and sit in front of the TV."

"In this model of understanding everyday events, the same situations (researcher points to identical situations on hand out – Figure A2) can have very different outcomes (researcher points to the different behaviours on the hand out – Figure A2) depending on how you interpret that event."

Pause

"There are other things that we can notice about this:

- Firstly, even though you have these thoughts, or interpretations, about the event (research to point to thought bubbles), it does not mean that they will happen i.e. you don't know for sure that you'll enjoy the snow or be inconvenienced by the snow… even if you have good reason to think that (such as evidence from past experiences with the snow).

- Secondly, your behaviour can reinforce or provide evidence for your thought i.e. by rushing out to enjoy the snow, you'll continue to think of snow as fun in the next blizzard; by slamming the door and storming around, you'll continue to think of snow blizzards as inconvenient etc."

"Let's fill in a model for what happens when you come across a spider" (researcher to prompt participant to write down their usual thoughts, feelings and behaviours in presence of spider on page two of the handout – Figure A3).

"So you can see that certain thoughts or interpretations that you have about spiders, lead you to feel a certain way, which in turn influences how you behave. By escaping or avoiding the spider, you don't get to ever find out if what you think will happen, is going to happen. In

other words, you have yet to find out if these thoughts you have about spiders (researcher to read out what participant has written on the handout – Figure A3) are indeed true."

Pause

"In other words, avoidance or escape prevent us from facing our fears, when actually we know that facing this fear is the most effective way of overcoming it. There are many ways to avoid or escape a situation:

- You could literally avoid spiders – for example, purposefully not going to places where spiders might be: gardens, sheds, attics, basements etc.
- You could literally escape spiders by running away.
- You can also mentally avoid spiders. For example, imagine you are loading boxes into your basement. You see a spider and think that it might bite you. Instead of literally running away, you could make yourself hurry up with the boxes, but think afterwards, 'the spider didn't bite me because I rushed with the boxes so it did not get the chance'. In other words you prevent the catastrophe (researcher to point to *participants' thought bubble* – Figure A3) by rushing, and don't find out if the spider actually was going to bite you."

Pause

"We've covered a lot of material so far, so before we continue, let's review. Can you tell me what you've understood from the session so far?"

Participant to demonstrate that they have understood the basic model for understanding the connection between situations, thoughts, feelings and behaviours, and to demonstrate an understanding of how safety behaviours maintain their fear. Researcher to go over this with the participant as long as necessary to ensure that they have understood this before proceeding.

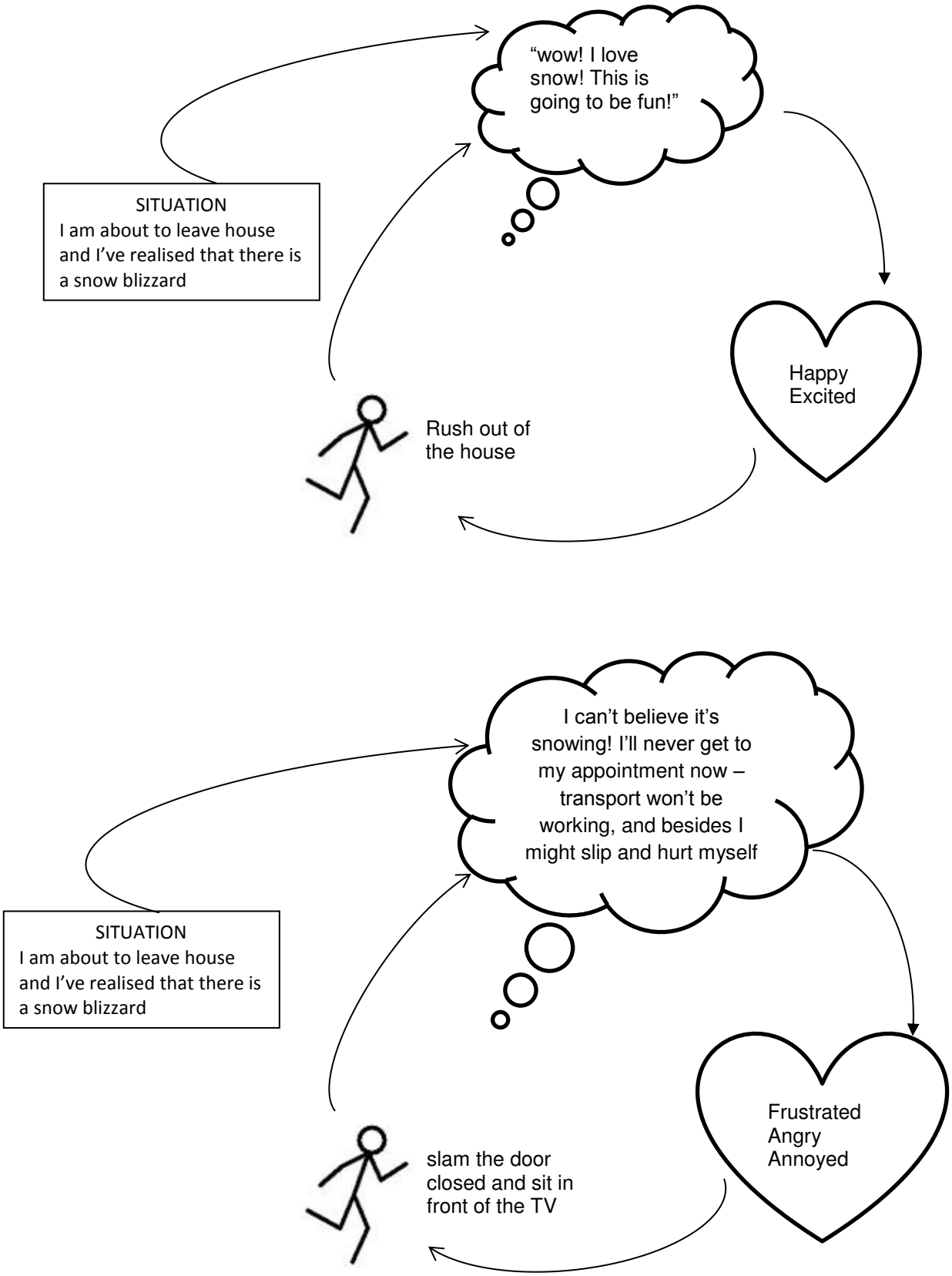

Figure A2. CBT maintenance cycle. Basic situation-thoughts-feelings-behaviours cycle (Beck, 2011) to support rationale for the session.

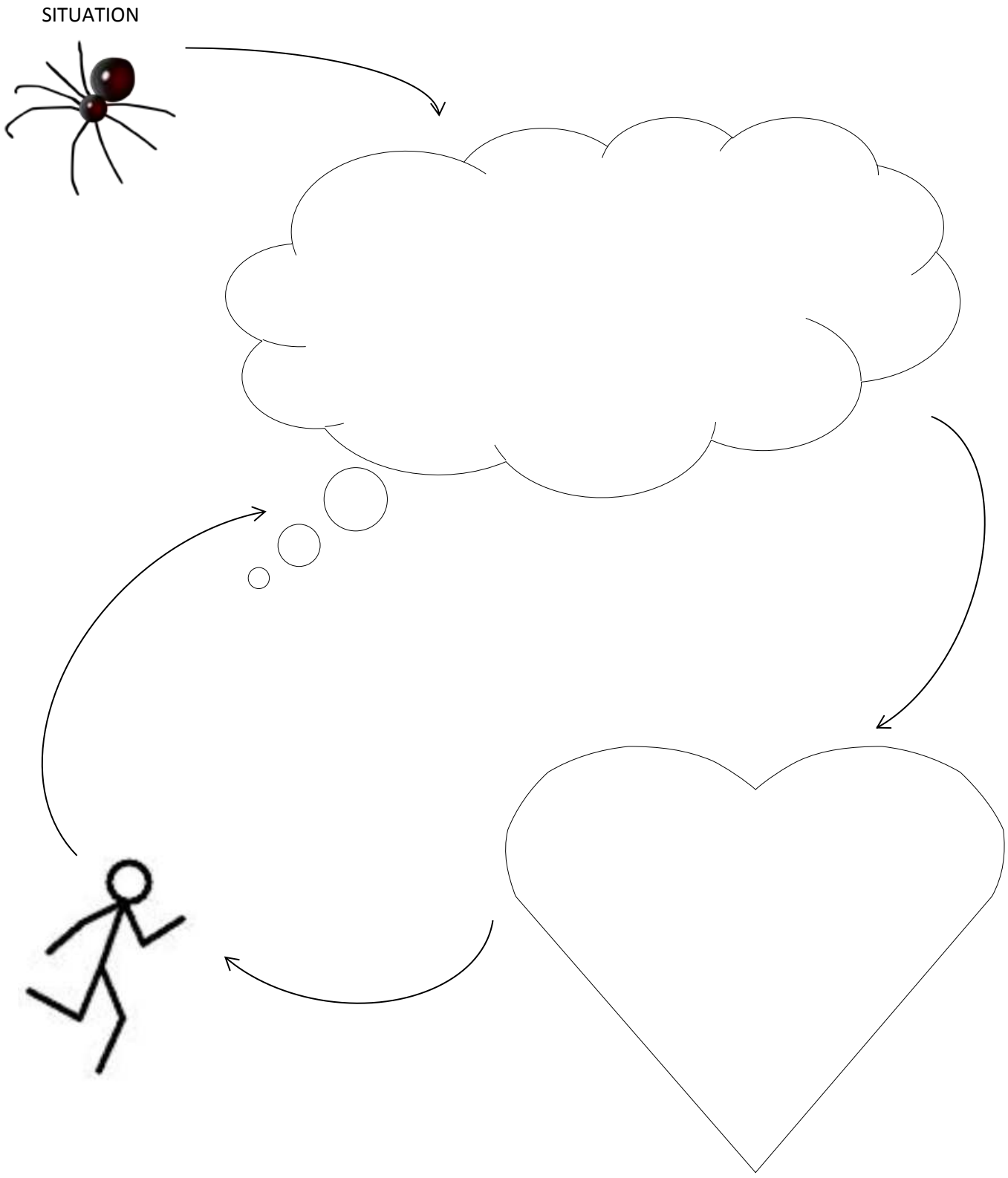

Figure A3. Participant Maintenance Cycle. Researcher and participant fill in the thoughts, feelings and behaviours that typically occur when the participant is faced with a spider.

Appendix F

Participant Consent Form

Title of Project:	The impact of using safety behaviours when undertaking fear tolerance in anxiety disorders.
Name of Researcher:	Roberta Bowie, Trainee Clinical Psychologist Salomons Centre of Applied Psychology
Supervisors:	Dr Blake Stobie, Consultant Clinical Psychologist South London and Maudsley NHS Trust Dr Fergal Jones, Senior Lecturer and Clinical Psychologist Salomons Centre of Applied Psychology

Please initial all boxes

1. **I confirm that I have read and understand the information for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily.** ☐
2. **I understand that my participation is voluntary and that I am free to withdraw at any time without giving any reason, without my medical care or legal rights being affected.** ☐
3. **I understand that this is a supervised project and give permission for the named supervisors to access to my data as part of this study** ☐
4. **I understand that data collected during this study may be published (anonymously) in a peer-reviewed journal. I also understand that this may include verbatim quotes of my responses during the data collection, but that these would again be anonymised.** ☐
5. **I agree to take part in this study.** ☐

Name of participant	Date	Signature
Name of person taking consent	Date	Signature

Appendix G

Participant Information Sheet

What is this study about?

This study is about the anxiety that people experience in certain situations (specific phobias). The example we have chosen is spider phobia. We are trying to work out the most helpful way for people to overcome their fear of spiders.

Why is this study happening?

There are lots of reasons as to why or how health professionals engage in research projects. In this case, completing a research project is one of the official standards to qualify as a Clinical Psychologist. This project is expected to contribute to the evidence-base for the profession so as to inform improvements in the way that Clinical Psychologists work.

Who is eligible?

We want to recruit people who are similar to the participants used in previous studies because this helps to be able to make comparisons between studies. We are therefore looking for psychology students who have a fear of spiders. Most people find spiders and other insects difficult to be around, but we are specifically looking for people who feel very anxious around spiders.

Inclusion criteria:

- Aged 18 years or over
- Specific fear of spiders
- Fluent in English
- Time to commit to three appointments for data collection

In order to keep the sample of participants as similar to each other as possible, we also have exclusion criteria. Unfortunately, if you meet any of the criteria below, we regret that you are not eligible to take part in this study.

Exclusion criteria:

- in current contact with community mental health teams
- diagnosed mental health difficulties (e.g. depression)
- previous formal treatment for specific phobia
- not registered with a GP
- under the age of 18 years old

What would I be asked to do?

Step one: screening

The first thing will be to ask you to fill in some forms. These include consent forms, information about yourself and questionnaires about spiders. At this stage, we regret that the participation of some people in the study will end, but you would still be welcome to attend a group debrief as a thank you for coming forward and for your time. This group debrief will also involve a bit more information about the study and spider phobia.

Step two: data collection

Participants will be randomly assigned to one of three groups in this study. The content of subsequent appointments will vary according to which group you have been assigned to. One of the groups will be a control group, which means participants in this group will not undertake the core part of the study. You will not be told if you are in the control group or not because of the impact that this could have on your participation. Each participant will be required to attend two or three appointments.

First appointment: you will be asked about some of the answers that you gave on the screening forms, but this is just to ensure that we understand what you have said. You will also be asked a bit more about your fear of spiders (such as how long you have been scared of them, how you respond when you see them, and the impact that spiders have on you). There will also be a task to complete. This task will involve indirect contact with a spider but you will not have to undertake this task if you do not want to. There are different stages to the task and you will only be asked to go as far as you comfortably can. You will also be free to stop any point in the task. At no point will you be tricked or forced into direct or indirect contact with a spider. Whether or not you choose to take part in that task, we will ask you about what it felt like by using rating scales. We expect this visit to last between 25 and 35 minutes.

Second appointment: this appointment will be similar to the first appointment and so not everyone is invited to this. In this appointment, we'll talk a bit more about the thoughts and feelings that you have about spiders. The researcher might also use a spider to demonstrate some of the ways that spiders work during this appointment. You will also be asked to fill in some questionnaires. These will all be questionnaires that you have filled in before and they take about 5 minutes each to complete. You will then be asked to complete the task with the spider again (same as the first visit). The materials or equipment that come with this task will vary according to which group you are in. As before, there will be different stages to the task and you will only be asked to go as far as you comfortably can. You will also be free to stop any point in the task. At no point will you be tricked or forced into direct or indirect contact with a spider. We expect this visit to last between 30 to 60 minutes.

Third appointment: this appointment will involve recapping the previous appointment(s), filling in the same questionnaires again and attempting the spider task again. At the end, everyone is asked to complete a second task with a spider. This task does involve direct contact with a spider but again there will be different stages to the task and you will only be asked to go as far as you comfortably can. At no point will you be tricked or forced into direct or indirect contact with a spider. We expect this visit to last between 30 to 60 minutes.

What if I change my mind?

We will be happy to discuss alternatives with you. For example, you may have assignments due and feel like you cannot fit in the appointments, or you might be going away on holiday etc. We will try to be as flexible as possible to accommodate your needs.

However, if you change your mind about taking part altogether, you can withdraw from the study at any point, and you do not have to give a reason(s) for this. Equally though, we will be happy to discuss your reason(s) if this is something that you want to do.

Lastly, we are also happy to provide you with further information about overcoming a fear of spiders if you would like. Everyone is entitled to this information from us, regardless of whether they take part or not, or whether they complete the study or not.

Why have you asked me personal details (for example about my age, gender, ethnicity, level of education and employment status)?

Research papers usually contain demographic data about the participants. This helps when comparing results from different studies because researchers need to know if different participant groups are similar to the participants from previous studies.

How does confidentiality work?

All data will be kept securely on password protected documents, on a password protected computer, in an encrypted format. Your personal information is kept separately to the rest of the data so that analysis is done anonymously.

On all paperwork (other than the consent form and participant details form), participants will be identified by the first and last letters of their first name and last name to help protect anonymity (e.g. Roberta Bowie: RABE). All paperwork will be kept in a locked drawer.

What happens with the results?

The results will be analysed and written up for submission to the researchers' doctoral course (Salomons Applied Centre of Clinical Psychology). If appropriate, it will also be submitted to a peer-reviewed journal. No participants will be identified by name on any write-up.

What are the disadvantages of taking part?

We hope that you do not experience any disadvantages to taking part, although we acknowledge that it can be anxiety provoking to taking part in a study that involves the use of spiders. There is a small chance that you will continue to experience anxiety after the appointments, which is why we debrief after every session. During the debrief, you will be asked how you feel and whether you feel ok to leave the appointment.

What are the advantages of taking part?

We will invite all participants to a group workshop after all appointments have been completed. This will be a debrief of the study and a talk on spider phobia (i.e. discussion and

information about having a fear of spiders). This includes the speakers holding spiders, but participants will only approach the spiders as far as they comfortably can. It is organised as a thank you for taking part and for your time.

Participants will also be offered a free self-help book at the end of the study (even if they withdraw from the study at a later date). If you are unable to attend the group workshop, we will arrange for the self-help book to be posted to you.

If you have any questions, queries or doubts, please discuss these with the researcher, Roberta Bowie.

Appendix H

Ethical Approval

This has been removed from the electronic copy

Appendix I

There was a significant relationship between FSQ scores and BAT1 scores at follow-up, r_s = -.44, 95% BCa CI [-.70, -.10], p =.01 indicating that the higher the FSQ score, the lower the BAT1 score. There was also a significant relationship between FSQ scores and BAT2 scores at follow-up, r_s = -.50, 95% BCa CI [-.73, -.16], p = .003 indicating that the higher the FSQ score, the lower the BAT2 score.

Appendix J

Study Feedback

To whom it may concern

Thank you for expressing an interest in the above-named study. As requested, this feedback letter aims to explain a bit about the study and the results and implications.

This study was about anxiety – specifically, it was aimed at trying to improve the evidence-base for anxiety interventions.

The usual treatment for people accessing NHS services when they are highly anxious is to 'face their fear' – also known as 'exposure'. For example, someone who is afraid of heights, might be assisted to go to the top of a tall building. Of course, this is done in an ethical way: the therapist and client talk about the problem first so that a proper assessment is undertaken. The reason (or rationale) for exposure-based interventions is given, and a hierarchy of goals might be developed.

Although I've referred to exposure being the usual intervention, this can be done in different ways. The national guidelines that clinical psychologists follow recommend that exposure is done within a 'cognitive-behavioural framework'. However, there is a debate in the literature about what cognitive-behavioural therapy (CBT) look like:

- some studies say that CBT works better (ie helps the client more) when the client is allowed to use 'safety behaviours'
- other studies say that CBT works better when the client eliminates the use of 'safety behaviours'.

Safety behaviours are strategies that we all use from time-to-time to help us feel secure. They are avoidance strategies, and sometimes avoidance is helpful to us. However, the debate is whether safety behaviours help us when we experience high levels of anxiety.

As you might already be aware, I recruited people with a fear of spiders to test my hypotheses. I ask some people to be in the presence of a spider without any safety behaviours (exposure group). I asked another group of people to be in the presence of a spider with safety behaviours (safety group). Participants were free to choose whatever safety behaviours they (reasonably) wished. Most used gloves, others kept a bigger distance, others chose me as a source of reassurance – any strategy that was used to avoid the anxiety of being in the presence of a spider was recorded as a safety behaviour.

I asked people to complete four main measures: the fear of spiders questionnaire (FSQ), the spider phobia questionnaire (SPQ), a task that involved moving a spider from one jar to another, and another task that involved holding a spider with bare hands.

What I found was that the people who used safety behaviours scored significantly lower on the four measures than people who did not use safety behaviours. In fact, those who used

safety behaviours performed quite similarly to the control group (who got no intervention at all).

Although theory is an important part of any empirical piece of research, it was particularly important in my study because it was neglected in this area. My study showed support for cognitive theory and the inhibitory learning model. These suggest that when people undertake exposure work for anxiety, they need to create new ideas about the thing that they are afraid of. For example, many of participants thought that a spider would want to bite them. The exposure exercise helped that thought to become a lot weaker, and for some, it allowed new thoughts such as "spiders are usually harmless" to occur. As a result, they felt able to be in the presence of the spider with a lot more ease (and then perform better on the four outcome measures).

I hope that these results will be replicated with people that experience clinical levels of anxiety so that the evidence-based for exposure work can become more robust.

Kind regards,